Licensed,

June 10, 1669.

Roger L' Estrange.

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BAKER's Arithmetick:

TEACHING

The perfect Work and Practice of ARITHMETICK both in *Whole Numbers & Fractions.*

Whereunto are Added

Many RULES and TABLES of Interest, Rebate, and Purchases, *&c.*

ALSO,

The Art of DECIMAL FRACTIONS, intermixed with Common Fractions, for the better Understanding thereof.

Newly Corrected and Enlarged, and made more plain and easie

By *HENRY PHILLIPPES.*

LONDON,

Printed by *E. C.* & *A. C.* for *Nathanael Brook* at the Angel in *Cornhil*, near the *Royal Exchange*, 1670.

A 2

To the Right Worshipful
The Governours, Assistants, and
the rest of the Company of

Merchants-Adventurers,

Humphrey Baker *wisheth Health*,
with continual Increase of Commodity by their worthy Travail.

If the Knowledge of Arithmetick, Right Worshipful, were of so small Profit in the life of Man, or so little used in our worldly Affairs, that it might be well left, or but seldom frequented, it were well done by the Professors thereof, to pen very long and eloquent Orations, in setting forth the Commendation of the same. But since Experience hath taught the truth of the old Proverb, That where good Wine is to sell, there need no Garland be hanged out: *Methinks they do great Injury to Arithmetick, that seek to hear the Commodities thereof set forth in a short Epistle, and surely they overcharge me in laying such a Burthen on my back, as were too importable for the greatest Orator. For the skill*

 hereof

hereof is well known, immediately to have flowed from the Wisdom of God, into the heart of Man, whom he hath created the chief Image and Instrument of his Praise and Glory, revealing himself unto him so far as he judged convenient, whom notwithstanding he could not conceive to remain in the most secret Mystery of Trinity in Unity, were it not by the benefit of most divine Skill in Numbers, which Skill, as also the most full and effectual Knowledge of all other things unspeakable, God used in his wonderful Creation of all the World out of nothing, which he accomplished within the compass of certain Number of days, expressing moreover what he made in every day, and of certain his Creatures how many he made, as appeareth in the Book of Genesis, *written by special Revelation of the Holy Ghost, wherein the Divine Majesty of God could not be known unto us without the Knowledge of Numbers, nor* Moses *have understood what himself had written. And* Solomon *the wisest man that ever was, considering the very depth of all things within his mind, (to whom God had given a greater gift of Wisdom, than to any man either before or since) doubted not to break forth into these words, saying,* Thou O Lord hast disposed all

all things in Meaſure, Number, and Weight; *for thus it pleaſed him to judge, who in another place teſtifieth, how that he hath ſearched deeper into the Cauſes and Knowledge of all things, than any other man in the World.*

These Teſtimonies (Right Worſhipful) do manifeſtly teach us, what we ought to think of the Cauſe and Original of Arithmetick, and partly alſo how neceſſary it is in the Life of Man, that unleſs by nature we have ſome feeling and underſtanding therein, we are no better than Beaſts, and in this reſpect worſe; for that we attain not unto that whereunto we are as ſpecially born, as naturally they do, ſome to running, ſome to ſmelling, ſome to hearing, ſome to flying, and ſome to ſwimming. Take away Arithmetick, wherein differeth the Shepherd from the Sheep, or the Horſe-keeper from the Aſs? Surely but only in ſhape and figure, which as the learned affirm, is a very ſlender cauſe of Difference. Wherefore not without juſt cauſe have the Antient Fathers and Philoſophers ſingularly extolled the Knowledge of Arithmetick, diligently training up their Youth therein, as in a Science moſt neceſſary of it ſelf, conſidering the deep Devices, the profound Practices, and cunning Concluſions

therein contained; and also that it is the Key and Entrance into all other Arts and Learning: as well approved the noble Philosopher Pythagoras, *who caused this Inscription to be written in great Letters upon his School-door, where he taught Philosophy,* NEMO ARITHMETICÆ IGNARUS HIC INGREDIATUR: *Let none enter here that is ignorant in Arithmetick: which Saying, as it is proper and peculiar unto all sorts of men in the beginning and entrance into all liberal Knowledge and Faculties to be ensued and embraced, so surely above all other, it is next after the Word of God, most fit and necessary that it should be written upon your School-doors, (Right Worshipful) whose Trade and Travail is imployed in the noble Traffick of Merchandise, wherein you have need of continual recourse unto this excellent Art. The daily exercise whereof hath so sharpned your Judgments, and ripened your Understandings, that most of you are become singular therein, both to deal that way your selves, and to judge of other mens doings. And herein I am sure you are good witnesses with me how foolish and vain is their Opinion, which beside your most commendable Affairs, suppose and affirm, That Arithmetick is of small use unto any other men, seeing*

that

that the Laws of sundry Realms well instituted and guided, have deservedly accounted for fools, and unfit Members, (to rule or deal in a Common-wealth) all such as wanted the Skill of natural Arithmetick, deprived them both of Lands and Living: which as it tendeth to the no small Praise and Credit of Arithmetick: so am I constrained for Brevity sake, in few words to overpass both that and others which might be said in Commendation thereof; shortly admonishing your Worships, that whereas in times past, as is well known, I had travailed in a Book in English *of that Faculty dedicated unto you; being now enforced to run over the same, both amending and augmenting it with sundry Additions, I am so bold again to attempt your Worships with the Acceptation thereof: hoping that as in foretime ye have taken it such as it was, ye will now also deign to receive it, being in better case, I hope, than ever it was; a token of my good-will, howbeit a simple thing, wherein you may weigh the Heart, and not the Gift, proceeding from such a Fountain, that if better Skill and Knowledge had been matched to my good meaning, it should have been done otherwise to the better Contentation of your Worthiness. And therefore in the mean*

sea-

season, until it please God to furnish me in such sort, I rest in daily Prayer unto him, to maintain your Fellowship in happy estate, and to bless your purposes with lucky success, to guide your Voyages with wished increase, and to season your doings with all kind of Virtue, and to preserve your Lives with desired Health, to his Will and Pleasure.

Yours,

Jan. 4.
1584.

Humphrey Baker.

TO

TO THE
READER.

THis little Book, as it was one of the first, so it is one of the best of this Subject, and hath had as good Acceptance, as any other; which may appear by the often Impressions of it. Indeed as long as the Author lived, he was careful to be still adding and correcting it: and though he be dead, yet his Book is thought worthy to live, and not only to live, but to flourish. And therefore at the Request of my Friends I have not only perused the Book, and corrected the many Faults, which were crept in by the often Impressions of it since the death of the Author, but I have added many other things, which I hope will be of good Use and Profit to all, especially to such as are of ordinary Capacities. For it is my chief Study to make things as plain as I can unto such; and therefore I have much enlarged the first Part, which treats of ordinary Arithmetick, shewing some new ways, which make Multiplication and Division as easie as Addition and Subtraction. I have also to this Part added a new Chapter of Reduction very necessary, which takes in the Improvement and general Practice of all the former. And in the last place I have added the way of Casting up of Simple Interest and Rebate, and also of Compound

Interest

Interest and Rebate, for the valuation of Purchases present and in Reversion.

In the second Part treating of Fractions, I have intermixed the way of working by Decimal Fractions with the other Fractions, which in many Operations is far more plain and ready; but yet many times for exactness the other Fractions are very necessary, and thus knowing both, you may use either way as you think best; the one many times will help the other.

In the third Part I have continued the same care in rectifying the mistakes and the mis-placings of the Figures and Fractions of the Examples; and exemplified many of them by Decimal Fractions, to make them the more plain and easie both for your Understanding and Practice.

By all which I hope you will find the Book much improved and made more useful, not only for those who have it not, but also for those who may have already some or other of the former Editions. So not doubting of thy friendly Acceptance and favourable Censure, I rest

Yours,

Henry Phillippes.

THE

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Baker's Arithmetick:

THE FIRST PART.

SHEWING,

The Art of Arithmetick in *WHOLE NUMBERS.*

THE Art of Arithmetick consisteth chiefly of these Five General Parts.

1 *Numeration.*
2 *Addition.*
3 *Subtraction.*
4 *Multiplication.*
5 *Division.*

A *Number*, is as much as to say, a multitude or Company composed of many Units; as Two is composed of two Units, Three is composed of three Units, Four of four Units, Five of five Units, Ten of ten, Fourteen of fourteen, Fifteen of fifteen, Twenty of twenty Units, *&c.* The Definition of Number.

And therefore one Unit is no Number, but the beginning and Original of all Numbers: As if you multiply or divide an Unit by it self, it is resolved into it self, without any increase: but it is in Number otherwise; for there can be no Number, how great soever it be, but that it may continually be increased, by adding evermore one Unit unto the same.

CHAP. I.

Of Numeration.

The Definition of Numeration.

N*Umeration* is the Art whereby to expreſs and declare the Value of any Sum propoſed, and is of two kinds. The one gathereth the Value of a Sum propoſed; and the other expreſſeth any Sum conceived, by due Figures and Places: For the Value is one thing, and the Figures are another thing; and that cometh partly by the diverſity of Figures, but chiefly of the Places wherein they be orderly ſet. And therefore you muſt firſt mark, that there are but ten Figures or Characters which are uſed in Arithmetick; whereof nine of them are called Signifying Figures, and the tenth a Cypher, which is made like an o, and of it ſelf ſignifieth nothing, but if it be joyned with any of the other Figures, it increaſeth their Value; and theſe be they,

The ten Figures uſed in Arithmetick.

1	2	3	4	5	6	7	8	9	0
one,	*two,*	*three,*	*four,*	*five,*	*ſix,*	*ſeven,*	*eight,*	*nine,*	*cypher.*

Their double ſignification or value.

Alſo you ſhall underſtand, that every one of theſe Figures hath two values: One is alway certain, and hath his Signification of his own Form; and the other is uncertain, which he taketh of his Place.

Their value according to their place.

A Place is called a Seat or Room that a Figure ſtandeth in; and how many Figures ſoever are written in one Sum, ſo many Places hath the Value thereof; and that is called the firſt place, which is next toward the right hand of any Sum;

and

and ſo reckoning by order towards the left hand, ſo that that Place is laſt which is next the left hand. And contrariwiſe, when you expreſs the Value of the Figures in any Sum, you muſt begin at the left hand, and ſo reckon towards the right hand.

Every one of theſe Places, is ten times the value of the former, accounting that towards the right hand the firſt.

Thus any of the nine Figures being in the firſt place towards the right hand, ſignifies but his own value once, as 7 is but 7.

But in the ſecond Place he betokeneth his own Value ten times; as 70 is 10 times 7, that is to ſay, Seventy.

In the third Place it betokeneth ten times more, that is, an hundred times its proper Value: So 700 is an hundred times 7, that is, Seven hundred.

In the fourth Place every Figure ſignifies 10 times more, that is, a thouſand times its proper Value: Thus 7000 is Seven thouſand, 8000 is Eight thouſand; and ſo for any other Figure.

The reſt of the Places ſtill increaſe their Value 10 times. Thus,

70000 is 70 thouſand.
700000 is 7 hundred thouſand.
7000000 is 7 millions.

But for the eaſie and ready accounting of any great Number, you may divide it into ſeveral parts, by Points over them, taking three Figures from the right hand for each part, which may be called Ternaries; and ſo reckon the firſt of theſe three Figures, in the firſt Ternary, for Units,

the second for Tens, the third for Hundreds. In the second Part, or Ternary, the first Figure stands for One thousand, the second for Ten thousand, the third for an Hundred thousand. And in the third Part, or Ternary, the first Figure stands for A million, the second for Ten Millions, the third for An hundred millions. And so you may proceed farther; but this is as far as is needful for the most things.

Take notice, that a Cypher, or many Cyphers, may fill up any of the Places, and the Figures behind it have the same Dignity and Signification as if they were all Figures. This is all plain in the following Table of *Numeration.*

Note also, That all Numbers are divided into three kinds; that is to say, Digit Numbers, Article Numbers, and Mixt or Compound Numbers. The Digit Numbers, are all manner of Numbers under ten, which are these nine Figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, of the which I have spoken before. The Article Numbers are any kind which hath in the first place a Cypher, as this 0, and they may ever be divided just by ten, without any remain, as these, 10, 20, 30, 40, 50, 100, and all other such like. The Mixt or Compound Numbers contain divers and many Articles, or at the least, one Article, and a Digit, as 11, 12, 16, 19, 22, 38, 508, 1007, and so forth. And as any Article Number may be made a Compound, by putting thereto a Digit; even so likewise every Compound Number may be made an Article Number, by adding thereunto a Cypher at the end thereof.

What are Digit Numbers.

What are Article Numbers.

What are Mixt Numbers.

A Table of Numeration.

The Ternaries.

Hundreds of Millions	Tens of Millions	Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units	*How each Number is to be read, being divided into Ternaries.*
								1	One ——— ——— ——— 1
							1	2	Twelve ——— ——— ——— 12
						1	2	3	One hundred twenty three — 123
					1,	2	3	4	One thousand ——— ——— 234
				1	2,	3	4	5	12 thousand ——— ——— ——— 345
			1	2	3,	4	5	6	123 Thousand ——— ——— 456
		1,	2	3	4,	5	6	7	1 Million 234 Thousand —— 567
	1	2,	3	4	5,	6	7	8	12 Millions 345 Thousand — 678
1	2	3,	4	5	6,	7	8	9	123 Millions 456 Thousand 789
9	8	0,	7	6	0,	5	4	0	980 Millions 760 Thousand 540

CHAP. II.

Of Addition in Whole Numbers.

ADdition is as much as to put together two Sums, or more, into one: As if there were due to any Man 223 *l.* by ſome one body, and 334 *l.* by another, and 431 by another; and you would know how many Pounds are due to the ſame Man in all: Theſe three Sums ſhall you ſet down orderly, the one under the other, writing the greateſt Sum higheſt, and the next to the greateſt under it, and the leaſt Sum laſt; in ſuch ſort that the firſt Figure of the one Sum towards your right hand, be directly under the firſt Figure of the other, and the ſecond under the ſecond, and ſo forth in Order.

How to add 2, 3, or more ſeveral Sums together.

When you have thus done, draw under them a ſtraight Line, and then they will ſtand thus.

431
334
223

Now begin always at the firſt places toward your right hand, and put together the three firſt Figures of the firſt places of thoſe three Sums, and look what cometh of them, and write that under them beneath the Line, ſaying, or reckoning to your ſelf thus: 3 and 4 are 7, and one makes 8; and accordingly write 8 under them, as here you ſee.

431
334
223
8

And then go to the ſecond places of the Figures, and do likewiſe, ſaying, 2 and 3 make 5, and 3 makes 8, and ſo write 8 under them, as you ſee here.

431
334
223
88

Laſtly,

Lastly, Do likewise with the Figures which are in the third place, saying, 2 and 3 make 5, and 4 is 9, and so put 9 under them; and so will your whole Sum appear thus: Whereby you may perceive, that those three Sums being added together, do make 988 *l.*

431
334
223
988

And this is the Art of *Addition* according to its simplicity, when the Sum of any Place doth not exceed the number of Nine. But in case the Sum of any one Place cannot be expressed by one Figure, but by two, you shall put the first of those Figures under the Line, and keep the other in your mind, for to add it unto the first Figure of the next place. And if the same next place cannot be valued but by two Figures, you must in like manner put the first of those Figures under the Line, and reserve the second for the other place next after; and thus must you do from one place to another, until you have come to the last place; where if it happen you do find that the Sum be of two Figures, you must set them both down, because it is the End of that Work; as in this Example. 2 Rule.

Wherein summing up the first Figures, I say, 3 and 1 is 4, and 5 is 9, and 6 is 15: So I write down 5 under the Line, and carry the one to the next place of Figures, and sum it up with them, saying, 1 which I bring and 2 is 3, and 9 is 12, and 4 is 16, and 5 is 21: So I write down 1, and carry the 2 to he third place, the which, with the other Figures

734682456
450932345
13467891
4672123
1203754815

gures, 1, 8, 3, and 4, do make 18, therefore I put 8 next after 1, in the third place under the Line, and keep 1 to be added unto the Figures of the fourth place, which are 2, 7, 2, 2, the which, with the 1 that I keep, do make 14. I set down 4 for the fourth Figure (under the Line) that is to say, behind 8, and I keep 1, to be added unto the Figures of the fifth place, the which is 7, 6, 3, and 8, which, with the 1 that I keep maketh 25: I put 5 in the fifth place under the Line next after 4, and I keep 2 in my mind, to be added with the Figures of the sixth place, that is, with 6, 4, 9, and 6, and that 2 which I keep maketh 27: I write down 7 under the Line in the sixth place, and I keep 2, which I add with the Figures in the seventh place, and they make 13: I put down three under the Line in the seventh place, and add one unto the Figures in the eighth place, and they are 10: I do put 0 under the Line in the eighth place, and then I add 1 unto the ninth place, that is to say, with 4 and 7, and they make 12; the 12 I write at length under the Line, because it is the end of this Addition. And this is to be done of all such like.

For the easier understanding of that which we have spoken of *Addition*, you may examine these two other Examples following, in the which, the first hath these Numbers, 3570, 2763, 579, and 28; which being added together, do make this Number, 6940: And of the second Example, doth result this Number, 51683, by adding together of these Numbers, 47630, 3756, 272, 25, as here followeth.

The

The Numbers to be added	3570	47630
	2763	3756
	579	272
	28	25
The Line between them	———	———
The Sum of the Additions	6940	51683

Addition of Money.

But if I have any Sums which are composed of divers kinds of Denominations, as Pounds, Shillings, Pence, or any other kind; First you must consider how many of the lesser, make one of the next sort: Thus in Money, 4 Farthings make one Penny, 12 Pence make one Shilling. and 20 Shillings make one Pound: and so carry the Shillings from the Pence to the Shillings, and the Pounds from the Shillings to the Pounds, as you may see more plain in the working of this Example.

Suppose these Sums, 25 *l.* 17 *s.* 4 *d.* and 14 *l.* 13 *s.* 8 *d.* and 16 *l.* 19 *s.* 7 *d.* to be added together. I must first set down all the said Sums the one under the other, as here you see; placing the Title of Pounds right over the Pounds, the Shillings over the Shillings, and the Pence over the Pence, keeping likewise the due order of their Places, in each Denomination: and then I begin at the least Denomination,

li.	*s.*	*d.*
25	17	4
14	13	8
16	19	7
57	10	7

which are Pence; and I say thus, 4 and 8 make 12, and 7 makes 19 *d.* that is 1 *s.* and 7 *d.* I set down 7 under the Line against the place of Pence, and

and I keep in my mind 1 *s.* to be added to the place of Shillings: this done, I proceed to the said place of Shillings, saying, 1 *s.* that I keep, and 7 *s.* are 8, and 3 are 11, and 9 do make 20: I put 0 under the Line against 9, and do keep 2 in my mind. Coming then unto the tens of Shillings, I say, 2 that I keep, and 1 makes 3, and 1 makes 4, and 1 makes 5, which are 5 tens of Shillings, that is to say, 2 l. and 1 ten over, the which I put behind the 0 towards my left hand, under the tens of Shillings, and I do keep 2 *l.* in my mind. Then I come to the place of Pounds, and say, 2 *l.* that I keep, and 5 are 7, and 4 are 11, and 6 do make 17 *l.* I set 7 *l.* under the Line against 6, and keep 1 in my mind. Then coming unto the tens of Pounds, I say, 1 that I keep, and 2 are 3, and 1 is 4, and one makes 5, the which I write down under the Line behind the 7; and so is this Addition ended: And thus the said three Sums being added together, do amount to 57 *l.* 10 *s.* 7 *d.* And thus is to be done of all other Sums of any other Denominations.

Other Examples.

li.	*s.*	*d.*
225	12	6
47	3	9
38	18	7
5	00	8
316	15	6

li.	*s.*	*d.*
5678	13	09
608	00	10
400	17	11
56	18	08
9	12	07
6754	03	09

Note

Note here, though this Author begin at the top of the Sums, yet it is more usual to begin at the bottom, and so reckon them upward, rather then downward.

Also in casting up of long Bills, where many Shillings are in the Pence, it is a good plain way to make a prick, or some small mark, for every Shilling; and so setting down the odd Pence at the last, tell over how many pricks you have made, and carry so many Shillings to the Column of Shillings.

But others more ready and expert, count how many Pence are in the whole Column, and so by some such Table as this, got by heart, can readily tell how many Shillings and odd Pence are in any number of Pence.

d.		s.	d.		s.
12		1	132		11
24		2	144		12
36		3	156		13
48		4	168		14
60		5	180		15
72	are	6	192	are	16
84		7	204		17
96		8	216		18
108		9	228		19
120		10	240		20

Or else make a mark at every 60 *d.* which make 5 *s.*

For the proof of these Sums, whether they be cast up right or not, the way usually prescribed, is to draw a Line under the first Sum in your Bill, and then cast over the rest again, and so add it to the first Line; and then if the Sum by

be the ſame as before, the Work is right.

But it is as eaſie or better to caſt over your whole Sum again; and if you think (that by doing ſo) you may fall into the ſame miſtake as before, you may caſt it up the contrary way: *viz.* if you began to caſt it up at the bottom before, you may now begin at the top, and ſo go downward; for the Account will come to one and the ſame Sum, if it be caſt up right.

But Tradeſmen, and Merchants, who are moſt concerned herein, have another help, and that is writing out Bills by their Books: If they find the Sums in both do not agree, there muſt needs be ſome miſtake either in the one or the other, which muſt be found out by new caſting over again.

Addition of Weights.

In *Haverdupoiz* Weight you muſt know, that 16 drachms make 1 ounce, 16 ounces make 1 pound, 28 pounds make a quarter of an hundred, 56 pounds half an hundred, 112 *li.* one hundred, and 20 hundred is one Tun. And accordingly you muſt carry your Denominations as before in the Addition of Money.

E X A M P L E.

Great Weights.				Small Weights.		
Tun.	*C.*	*qrs.*	*li.*	*li.*	*ou.*	*dr.*
2	15	3	27	8	15	12
2	10	2	18	4	08	14
2	15	1	11	6	09	02
2	12	3	14	4	12	04
10	14	3	14	24	14	00

In

In *Troy* Weight,
24 grains make one penny weight,
20 penny weights make one ounce,
12 ounces one pound.

lib.	oz.	p.weig.	gr.	oz.	p.weig.	gr.
5	10	16	20	4	08	12
10	05	8	10	3	06	6
15	06	10	05	2	03	4
10	10	15	15	1	02	2
42	9	11	02	11	00	00

Apothecaries Weights and Marks.
20 Grains make a Scruple ℈.
3 Scruples make a Drachm ʒ.
8 Drachms make an Ounce ℥.
12 Ounces make a Pound ℔.

℔	℥	ʒ	℈	gr.
12	10	5	2	16
9	8	7	1	12
22	7	5	1	8

Addition of Measures.
Woollen and Linnen Cloth,
4 Nails is one Quarter,
4 Quarters one Yard.
So also hath the *English* Ell.

Yds.	qrs.	nails	Ells.	qrs.	nails
21	2	2	40	1	2
22	3	3	35	2	3
20	0	0	45	3	1
24	1	1	50	0	0
88	3	2	171	3	2

Measure

Measure for Land.

12 Inches make one Foot.
3 Foot make one Yard.
5 Yards and half, or 16 Foot and half, one Pole.
40 Poles one Furlong.
8 Furlongs one Mile.

Mil.	*Furl.*	*Poles.*	*Yards.*	*Feet.*	*Inches.*
1	4	10	4	2	6
2	1	30	3	1	9
3	6	20	1	0	3
4	7	25	1	1	6
12	4	07	0	0	0

Measures for Wine and Corn.

2 Pints 1 Quart.
2 Quarts 1 Pottle.
2 Pottles 1 Gallon

16 Pints 1 Peck.
4 Pecks 1 Bushel.
8 Bush. 1 Quarter.

gal.	*pottl.*	*qts.*	*pts.*
4	1	1	1
2	1	0	1
1	0	1	0
0	1	0	1
9	0	1	1

quar.	*bush.*	*peck.*	*pin.*
1	2	3	4
5	6	2	8
9	7	1	0
3	0	0	4
20	0	3	0

CHAP.

CHAP. III.

Of Subtraction in Whole Numbers.

S*Ubtraction* teacheth how you ſhall Subtract any leſſer Number from a greater, and ſheweth what there doth remain, after that you have ſubtracted the ſame.

In *Subtraction* you muſt have reſpect to three Numbers: The one is the Number from which the Subtraction is made; The ſecond is the Number that is to be ſubtracted; and the third is the Number which remaineth after the Subtraction is ended. As when I would ſubtract 25 from 40, the ſaid 40 is the Number from which the Subtraction is made, and 25 is the Number to be ſubtracted, and 15 is the Number which remaineth after you have ended the Subtraction. Rules to be obſerved in Subtraction. 1 Rule.

When you are to ſubtract one Number from another, you muſt put the leſſer Number under the greater, in ſuch ſort, that every Figure of the one Number, may anſwer unto every Figure of the other, orderly, according to their places; and then draw a right Line under thoſe two Numbers, as you did in Addition. 2 Rule.

Having thus placed your two firſt Numbers, you muſt begin at the right hand, and take the firſt Figure of the undermoſt Number, and ſubtract that from the firſt Figure of the uppermoſt Number over it; and that which remaineth you muſt ſet underneath the Line, right under the Figure which you have ſubtracted: Then afterward 3 Rule.

watd take likewise the second Figure of the nethermost Number, and abate that also from the second Figure of the higher Number; the third from the third; and so forth of all the rest, till you come to the end; putting always the Remainer of every Figure under the Line in its due order and place. As for Example: I would subtract 2345, from 9876. After that I have set them down according to the manner aforesaid, then beginning at the first place next to my right hand, I take first 5 from 6, and there resteth 1; the which 1 I set under the Line right against 5. Secondly, I subtract 4 from 7, and there resteth 3; the said 3 I set in the second place under the Line next after 1. Thirdly, I subtract 3 from 8, and there resteth 5; the which 5 I put under the Line in the third place next after 3. Finally, I subtract 2 from 9, and there resteth 7; the which 7 I put under the Line in the fourth and last place next after 5: And thus is this Subtraction ended, and there remaineth 7531.

$$\begin{array}{r} 9876 \\ 2345 \\ \hline 7531 \end{array}$$

4 Rule. When there is a Cypher to be subtracted from any Figure, you may say, Nought from 2, 3, or any other Figure, and there remains 2, 3, or any other Figure which is over the Cypher: But when two Figures of one likeness do chance to meet, so that the one must be subtracted from the other (as if I should subtract 7 from 7) there would remain nothing; then must I set a Cypher under the Line. But when the Figure which is to be subtracted doth exceed the Figure which is over him, so that it cannot be taken out of the same Figure, then must you subtract the under-

most

most Figure from 10, and that which doth remain, you shall add unto the same Figure which is uppermost; and the Sum which resulteth of them both, you shall set under the Line. Or else, Borrow 10 of the next Figure, and add it to the Figure out of which you should make your Subtraction, and then subtracting your Figure from the result of 10 and the upper Figure, set the Remainer under it. But whensoever you do borrow any such 10 of the over Number, you must add 1 to the next nethermost Figure following, which is yet to be subtracted. This is the hardest part of Subtraction; but the Example, and a little Practice, will make it easie.

Example. I would subtract 93570 from 4037479. After that I have placed my two Numbers as I ought to do, First, I subtract 0 from 9, and there resteth 9; then I put the 9 under the Line, right under the 0. And secondly, I subtract 7 from 7, and there resteth nothing; I do therefore put a Cypher 0 under the Line against 7 in the second place. Thirdly, Then I come to the third place, where I find 5, which I cannot subtract from the Figure over it, which is but 4; therefore I do subtract it from 10, as before I taught, and there resteth 5; the which 5 I do add to the 4 which is over him, and that maketh 9: So I put 9 in the third place under the Line, for the third Figure. Or else, because I cannot subtract 5 from 4, I borrow ten, and adding it thereunto, say, 5 from 14 there remains 9, which I place under it, as before. Fourthly, for the 10

$$\begin{array}{r} 4037479 \\ 93570 \\ \hline 3943909 \end{array}$$

which I borrowed, I add 1 unto the next Figure which is to be ſubtracted, which is 3, and they make 4; the ſaid 4 I do ſubtract from the over Figure 7, and there reſteth 3; I put 3 under the Line for the fourth Figure. And then I come to the fifth place, where I do find 9, which I cannot ſubtract from the Figure over him, which is but 3; but I do ſubtract 9 from 13, and there reſteth 4, the which Figure 4 I put under the Line for the fifth Figure. And here is to be noted, that if it were not for that I did at the laſt borrow 10, the Subtraction ſhould have been ended: But becauſe that I muſt (for every ſuch 10 that I borrow) always add 1 unto the next lower Figure following, I muſt therefore proceed unto the Subtraction: And becauſe there is no other Figure following in the lower Number, I ſhould ſubtract this from the next over Figure; but I find there 0, and therefore I cannot ſubtract 1 from 0, therefore I ſubtract it from 10, and there reſteth 9, which I do put under the Line in the ſixth place. Finally, for rhe 10 which I borrowed, I keep 1 in my mind, the which I do abate from 4, and there remaineth 3; the which 3 I do put under the Line in the ſeventh place after 9, and ſo the Operation is ended.

Another Example.

From——————576084025
Subtract ————485675437

——————

Reſts———— —— 90408588

5 Rule. But if there were many Numbers to be ſubtracted from one Number alone, then muſt you firſt add theſe Numbers together, according to the inſtruction

ſtruction of the Chapter going before, and afterterward make your Subtraction as above is ſaid. As if I would ſubtract theſe three Sums, 123,234,456, from 98925; firſt I do add the three Sums into one, and they art 813; the which I do ſubtract from 98925, and there reſteth 98112.

From ——	98925
Subtract theſe numbers.	123
	234
	456
Their Sum	813
Reſts ——	98112

But if the Sums be compoſed of divers kinds of Denominations, then you muſt begin at the leaſt Denomination next toward your right hand, and ſo ſubtract every Denomination from his like, if it may be ſubtracted: If it cannot be ſubtracted, then you muſt borrow one of the next Denomination toward your left hand, and reduce the ſame into the like Denomination of that Figure which is to be ſubtracted; then ſhall you ſubtract your firſt or leaſt Denomination from the ſaid Sum ſo borrowed, and that Figure or Number that ſhall remain, you muſt add with the uppermoſt Number of the leaſt Denomination, and ſet the Aggregate under the Line right againſt his like: Then the 1 which you did borrow muſt be added with the next Figure of the next Denomination that is to be ſubtracted; and ſo to preceed with the whole Sum that is to be ſubtracted.

Example. I would ſubtract 15 *l.* 17 *s.* 11 *d.* from 28 *l.* 13 *s.* 9 *d.* I do firſt put down the greater Sum, and under that the leſſer, with a Line un-

der them, as here you see; and then I do begin at the least Denomination, which are Pence, where I say, 11 *d.* from 9 *d.* I cannot; and therefore I do borrow 1 *s.* of the next Denomination, that is, of the 13 *s.* in the which 1 *s.* are 12 *d.* Then I subtract 11 *d.* from 12 *d.*

li.	*s.*	*d.*
28	13	9
15	17	11
12	15	10

and there remaineth 1 *d.* the which 1 *d.* I do add to the 9 *d.* and they make 10 *d.* the said 10 *d.* I set under the Line, and do keep the 1 *s.* in my mind that I borrowed: Then come I to the second Denomination of Shillings, where I do find 17 *s.* then I say, 1 *s.* that I borrowed, and 17 do make 18 *s.* the said 18 *s.* out of 13 *s.* cannot be, therefore I borrow 1 *l.* of the next Denomination, that is to say, out of the 8 *l.* and in the said 1 *l.* are 20 *s.* then I subtract 18 *s.* from 20 *s.* and there remaineth 2 *s.* the which I do add to the 13 *s.* and they do make 15 *s.* the same 15 *s.* I set under the Line, and so keep 1 *l.* to be added to the lower place of Pounds; then I say, 1 *l.* that I keep, and 5 are 6: I subtract 6 *l.* from 8 *l.* and there remains 2; I set the said 2 under the Line against 5. And last of all, I come to the Tens of Pounds, where I do find 1; then I do subtract that that 1 from 2, and there remaineth 1, which I set under the Line, and so I find there remaineth 12 *l.* 15 *s.* 10 *d.* And so is it to be done of all other like.

For the Proof of this, to know whether you have cast it up right or not, Add the Number subtracted, and the Sum that remains together, and if you have done right, they will make the first Sum exactly, otherwise not.

Debt

	li.	s.	d.		li.	s.	d.
Debt	28	13	9	*Rec. in*	66	13	4
Paid	15	17	11	*Paid out*	42	6	8
Rests	12	15	10	*Rests*	24	6	8
Proof	28	13	9	*Proof*	66	13	4

Sometimes the Sum to be ſubtracted is in ſeveral Parcels; then it muſt firſt be all brought into one Sum, and then ſubtracted out of the firſt Sum, and proved as before.

	li.	s.	d.
Bought Goods in Value to	548	16	8
Sold out	145	04	6
Sold more	086	13	4
Sold more	153	06	8
Sold in all	385	04	6
Remaining	163	12	2
Proof	548	16	8

Subtraction of Weight or Meaſure is all after the ſame manner, having reſpect to the ſeveral Denominations, to ſet them under each other, and when you have occaſion to borrow, take one of the next greater Denominations. For Example.

	C.	qrs.	li.
A Chest of Sugar weighing in all	4	3	21
Sold out of it	1	2	0
Sold more	1	0	0
Sold more	0	1	0
Sold more	0	0	12
Sold in all	2	3	12
Rests unsold	2	0	9
Proof	4	3	21

CHAP. IV.

Of Multiplication.

1 Rule. IN *Multiplication* there are three Numbers to be noted; that is to say, The Number which is to be multiplied, which we will call the Multiplicand: The second is the Number by the which we do multiply, which we will name the Multiplier, or Multiplicator: And the third Number is that which cometh of the Multiplication of the one by the other, which is called the Product. As when I would know how much amounteth of 10 multiplied by 9, *viz.* How much are 10 times 9; I find that there amounteth 90. Here 10 is the Multiplicand, and 9 is the Multiplier, and 90 is called

called the Product. So that to multiply is none other thing, but to find a Number which containeth the Multiplicand, so many times as the Multiplier containeth Units: As 10 multiplied by 9 do make 90, as before is said. And 90 containeth 10 so many times as 9 containeth Units; that is to say, 9 times.

In *Multiplication* it forceth not much which of the two Numbers be the Multiplicand, nor which be the Multiplier: For 10 multiplied by 9, maketh as many as 9 multiplied by 10. Yet nevertheless it shall be more commodious, that the lesser Number be always the Multiplier. And because the Multiplication of single Figures the one by the other, is the chief and necessariest thing whereby to know how to work in the Multiplication of Compound Numbers, and that every Man hath not the same at their fingers ends, I will therefore give you here certain easie ways of Multiplication of Digit Numbers. 2 Rule.

When you would multiply two simple Figures, or Digits, set them one under the other, and subtract each of these Digit Numbers from 10: Then multiply the two Remains the one by the other, and if the Sum do exceed 10, write only the first Figure, and keep the other to be added to the next Operation, which is thus as followeth. Add your two simple Figures together, and of that which resulteth of the Addition, take only the first Figure, unto which you must add the Unit which you did keep before; and that shall be the second Figure of the Sum which you do seek. 3 Rule. Several ways to multiply the Digit Numbers.

Example. I would multiply 7 by 6, I take

7 from 10, and there reſteth 3; likewiſe I ſubtract 6 from 10, and there reſteth 4: Then I ſay thus, 3 times 4 make 12: I write 2 for my firſt Figure, and keep 1 in my mind. Then I add 6 with 7, and they are 13; of the which I caſt away the ſecond Figure toward my left hand, which is 10, and I take only the firſt Figure 3 which is toward my right hand, unto the which I add the Unit which I kept, and they make 4, which I write in the ſecond place after 2; and thus I find 42, which is the value of 7 multiplied by 6.

7	—	3
6	—	4
4	—	2

A Second Way.

Otherwiſe, ſet down your two Digit Numbers the one right over the other, with a Croſs; and right againſt every of them, towards the right hand, write his own difference from 10. Then multiply the two Differences together, the Figure which cometh thereof ſhall you ſet down under both the Differences: Afterward ſubtract either of the Differences, from the Figure which ſtands croſs ways againſt it, and ſet the Remainer under it: So theſe two under Figures ſhall be the Sum deſired.

Example. I would know what 7 times 8 is. Set the Figures as in the Margent, with a Croſs; then ſay, 7 wants 3 of 10, and 8 wants 2, which ſet at the ends of the Croſs, and draw the Line under them; then ſay, 2 times 3 is 6; and then ſubtract 2 from 7, or 3 from 8, and there remains 5, which being ſet down as you ſee, ſhews the Number deſired to be 56.

numb.		*diff.*
7	X	3
8		2
5		6

Note

Note here, If in the multiplication of the Differences, their number exceeds 10, you must carry one to the last Figure.

As if you would know how much 6 times 7 is; Say, 3 times 4 is 12, set down 2 and carry 1; then 3 from 6 there remains 3, and 1 which I carry makes 4: So the Sum desired is 42.

6	X	4
7		3
4		2

Note, this Rule is of no use, unless the two Digit Numbers being added together, exceed 10; and indeed in such case it is needless; for any one may reckon or count what 5 times 5 is, or any Number under; though many times, for want of the Table, you may be at a stand for greater Numbers, in which this Rule is of best use.

Another way to know the Multiplication of simple Numbers, is by this Table following: The Use thereof is thus.

Find the two Numbers you would multiply, the one in the side of the Table, the other at the top of the Table; and in the square meeting of the said two Numbers, you will find the Number you desire.

This Table by some is cut shorter, because some of the Numbers are twice repeated; as 6 times 8 is all one with 8 times 6: but this is the plainer for Young Beginners; and to learn it by heart, say it after this manner.

A Table of Multiplication.

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81

First, A Cypher, or (o) doth neither add nor multiply: So that (o) times 2, 3, 5, or 9, produceth nothing, or a (o) only, to fill up the place.

If you are to multiply any Number by the Figure 1, it doth not multiply, but only adds the Figure multiplied thereby: So that one time 2, 3, 4, or nine, makes only 2, 3, 4, or 9.

The rest of the Figures multiplied one by another, make these Numbers.

Two times	2	is	4
	3		6
	4		8
	5		10
	6		12
	7		14
	8		16
	9		18

Three times	3	is	9
	4		12
	5		15
	6		18
	7		21
	8		24
	9		27

Four times	4	is	16
	5		20
	6		24
	7		28
	8		32
	9		36

Five times	5	is	25
	6		30
	7		35
	8		40
	9		45

Six times	6	is	36
	7		42
	8		48
	9		54

7 times	7	is	49
	8		56
	9		63

8 times	8	is	64
	9		72

9 times 9 is 81.

A good Rule to help your Memory.

The former part of this Table, to 4 or 5, is is easie to remember: And if for want of Practice you are not so ready in the greater Numbers, then you may help your self by parting one of the Digits into two halfs, or three parts. 4 Rule.

Thus if you would know how much 6 times 6 is, part it into two parts, and say, 3 times 6 is 18; and then 18 and 18 is 36. So for 6 times

times 7, ſay, 3 times 7 is 21, and 21 is 42. And thus when either both, or one of the Figures are an even Number, by halfing it, you may know the Product thereof very eaſily.

But now if both the Numbers be odd Numbers, you may do it by parting the Number into 3 parts, two whereof may be equal, and the third may be the Number once more repeated. Thus for 7 times 7, ſay, 3 times 7 is 21, and 21 is 42, and once 7 added to it makes 49, which is the Number deſired. So for 9 times 9, ſay, 3 times 9 is 27, and 3 times 27 is 81. And thus where you are at a ſtand, you may reckon up what any Digit Number comes to, being multiplied by a Digit.

5 Rule. To come now unto the Practice of Multiplication; When you would multiply two Numbers the one by the other, you muſt ſet them down after the ſame manner as you did in *Addition*, and in *Subtraction*; that is to ſay, the firſt Figure of the Multiplier, under the firſt Figure of the Multiplicand, the ſecond under the ſecond, and the third under the third, if there be ſo many; and then draw a right Line under them, as in the other Operations going before. After this, you ſhall multiply all the Figures of the Multiplicand by the Multiplier, and ſet down the Figures (coming of any ſuch Multiplication) under the Line, every one in their due Order and Place.

Example. I would multiply 123 by 3; that is to ſay, I would know how much 3 times 123 amounteth to. The two Numbers being placed in ſuch order as is before ſaid, you muſt begin towards

towards the right hand, and say thus, 3 times 3 are 9; write down 9 under the Line against 3 for the first Figure. Secondly, by the same 3 you must multiply the second Figure 2, saying, 3 times 2 make 6, and so put 6 after 9 under the Line. Thirdly, by the same 3 you shall multiply the last Figure 1, saying, 3 times 1 is 3, and set down 3 after 6 for the third and last Figure. And thus is the Work ended, whereby you shall find, that 123 being multiplied by 3 maketh 369.

123
3
369

But when it hapneth that of the Multiplication of one Figure by another, the Sum which cometh thereof shall be of two Figures, as it hapneth often, then shall you write down the first Figure, and keep the other Figure to be added unto the Multiplication of the next Figure. 6 Rule.

Example. Six Men have gained (every one of them) 345 Crowns: I would know how many Crowns they have in all. First I say, 6 times 5 is 30, and therefore I write 0 under the Line, and for 30 I do keep 3 to be added to the next Multiplication. Secondly, I say, 6 times 4 are 24; unto the which I add 3, which before I reserved, and they make 27: So I write 7 in the second place under the Line, and keep 2 to be added to the next Multiplication. Thirdly, I say, 6 times 3 are 18, unto the which I add the 2 which I kept, and they make 20, the which I write all down, because that is the last Figure. And so I find that 345 being multiplied by 6, do make 2070.

345
6
2070

When

7 Rule. When the Multiplier is of many Figures, you must multiply all the whole Multiplicand by every one of those Figures, and write the Products every one orderly one under another, beginning always under his own proper Figure.

Example. I would know how many days are past from the Nativity of our Saviour *Jesus Christ*, until the year 1560, full complete. I must here multiply 1560 by 365 days, because there are so many days in one whole year; the Leap-years being not reckoned, which have every one of them 366 days. Therefore first by the Figure 5 I multiply all the higher Figures saying thus, 5 times 0 maketh 0; I write 0 under the Line for the first Figure: and because I keep nothing for the next place, I proceed and say, 5 times 6 are 30, I set 0 under the Line for the second Figure, and I keep 3 to be added unto the next Multiplication. Thirdly, I say, 5 times 5 are 25, the which, with the 3 that I kept, are 28; I set down 8 for the third Figure, and keep 2 to be added with the next Multiplication. Then coming unto the fourth and last Figure, I say, 5 times 1 are 5, the which, with the 2 that I reserved, are 7; so I put 7 for the last Figure of the first Work by the Figure 5, with the which Figure I have no more to do; and therefore I cancel the same ~~5~~ with a little stroke through it, to signifie that I have finished with that Figure. And forasmuch that in Multiplication there is always as many simple Operations as the Multiplier containeth Figures, there resteth yet two Works to be made. I come therefore

1560
365
7800

to the secoud Work, which is the Figure 6, by the which I must again multiply all the Figures of the Multiplicand, as I did by 5: and the first Figure which shall be produced I do put one rank lower than the Figures of the last Work made by 5; not right under the first Figure of the Multiplier 5, but under 6; that is to say, one degree or place neerer toward the left hand, and one rank lower than the first Work: And I must put every one of the other Figures which cometh of the same Multiplication in their order after it.

1560
365
7800
9360

Thirdly, I do make the Multiplication by the third Figure, and that which shall come thereof I must set in his rank, as hereafter shall appear. And now I need make no further Discourse hereof, because that he which can do the first Multiplication by 5, may as easily do all the others.

1560
365
7800
9360
4680

Now, if you will know how much all these three Workings, thus placed, do amount unto, you must add all the Numbers which are come of the three Multiplications together; but not after the same manner as we have done in the Chapter of Addition, the first Figure of the first rank with the first Figure of the second rank, and so of the third; but you must add them in the same sort as you find them situated and placed one directly over another; that is to say, the first Figure of the first rank alone by it self, the second of the first rank with the first of the second rank; the third of the first rank, with the

the ſecond Figure of the ſecond rank; and with the firſt of the third rank; and ſo of all the other, as hereafter doth appear.

Firſt, there is 0 in the uppermoſt Line, therefore I ſet 0 directly under it: Then there is 0 in the ſecond Line, and alſo 0 in the firſt Line directly over it; theſe two Cyphers make 0, which I ſet directly under them. Then there is 0 in the third Line, and 6 and 8 directly over it, which makes 14; ſo I ſet down 4 and carry 1. Then there is 8, 3, and 7 in the next row, which make 18, and 1 I brought makes 19; ſo I ſet down 9 and carry 1. Then in the next row there is 9 and 6, which make 15, and 1 I carried makes 16; ſo I ſet down 6 and carry 1. Laſtly, 1 I bring and 4 make 5, which I ſet down, and ſo have done.

```
   1560
    365
 ------
   7800
  9360
 4680
 ------
 569400
```

And thus the 1560 years do contain 569400 days, not counting herein the days of the Leap-years, which are here in number 390; for then the whole Sum of days ſhould be 569790.

Another Way of Multiplication.

But this keeping or carrying of one Number to another, is ſomewhat difficult to thoſe who are young Learners, or ſuch as do not uſe themſelves to it; and therefore I ſhall ſhew you a good way how you may ſet down all the Figures at large, without troubling your Memory, which I have found very ready and profitable in great Numbers, to prevent Miſtakes.

For

For Example. Let this Number 789 be propounded to be multiplied by 9. First, set the Numbers to be multiplied the common way, Then say, 9 times 9 is 81, which set under the two first Figures the common way: Then 9 times 8 is 72, which you must set down underneath the other two Figures one place backwarder. Lastly, 9 times 7 is 63, which also must be set in a Line underneath, a place backwarder. Then sum it up by the common Rules, and the whole is 7101.

```
 789
   9
----
  81
 72
63
----
7101
```

But because this way, if the Sum were of many Figures, would take up much room, you may so contrive it, that you need never make above two Lines of any Multiplication, by a single Figure.

As for Example, in the same Sum. First say 9 times 9 is 81, which set down under the two first Figures.

```
789
  9
---
 81
```

Then say 9 times 8 is 72; set the 7 behind the 8 in the same Line, and the 2 just under the 8: So the Sum will stand as in the Margent. This is much as you set the Divisor in Division.

```
789
  9
---
781
 2
```

Then for the last Figure, 9 times 7 is 63; set the 6 behind the 7 in the upper Line, and the 3 under the 7: So the Sum will stand thus. Now draw a Line under it, and add the two Lines by the common Rules, and it makes 7101.

```
 789
   9
----
6781
 32
----
7101
```

To make this a little more plain and eaſie, take another Example.

It is now the year of our Lord 1669; and in every year there are as beforeſaid 365 daies and 6 hours, or one quarter of a day. How many days then is it in all ſince the Birth of our Lord?

Here you ſee I multiply 1669 by 365, beginning firſt with the Figure 5, ſaying, 5 times 9 is 45, 5 times 6 is 30, 5 times 6 is 30, 5 times 1 is 5; and ſet them down ſloap-wiſe, as before.

Then I come to the ſecond Figure 6, and multiply by that, ſaying, 6 times 9 is 54, which I ſet in another Line underneath, and one place backwarder, as the ordinary way; then 6 times 6 is 36, which I ſet the 3 behind the 5, and the 6 under the 5; and ſo the reſt of the Figures one after another, as before. And ſo you muſt do for the laſt Figure 3, as you may ſee by the Example plainer than by many words. Laſtly, Sum up the ſeveral Lines all into one, ſo it makes 609185 days: And if you add a quarter of the ſaid 1669 years, which is $417\frac{1}{4}$, ſo it makes $609602\frac{1}{4}$ days.

$$\begin{array}{r} 1669 \\ 365\frac{1}{4} \\ \hline 03345 \\ 500 \\ 03354 \\ 666 \\ 01127 \\ 388 \\ \hline 609185 \\ 417\frac{1}{4} \\ \hline 609602\frac{1}{4} \end{array}$$

This way to the Expert Artiſt may ſeem ſomewhat tedious; but the Numbers may be thus ſet down, ſooner than they can reckon their Carriage; and this way may be uſed only for a help to ſuch as are not ſo well practiſed in Arithmetick,

tick, when they multiply by Digits which are above 4 or 5.

Note, In uſing this way it will be good to fill up all the places of the Lines with Figures or Cyphers, for fear of miſplacing the following Figures, ſetting down your Figures always by couples, one in the upper Line, the other in the lower Line.

Some Rules to ſhorten Multiplication.

Firſt, When you would multiply any Number by 10, you ſhall only put one Cypher 0 before all the Numbers; that is to ſay, a Degree neerer to the right hand, as 345 multiplied by 10 maketh 3450. If you will multiply any Number by 100, add to the ſame Number two Cyphers thus, 00; if by 1000, add three 000.

Secondly, If you are to multiply any Number by 20, 30, or 200, or 400, or or any other Number with more Cyphers at the end; ſet them thus, as if you were to multiply only by the Figures; and let the Cypher or Cyphers hang over, and ſo add them to the Product, as in the Example.

```
 345
  20
----
6900
```

Thirdly, If you are to multiply a Number that hath a Cypher in the end thereof, by another Number that hath likewiſe a Cypher in the end thereof; ſet them thus, that the firſt Figure of the Multiplier may ſtand under the laſt Cypher of the Multiplicand, and ſo caſt them up.

```
  360
   60
-----
21600
```

Lastly, If there be a Cypher in the middle of your Multiplier, you need only make a Cypher to fill up the place, and so set the Sum which proceeds of the following Figure in the same Line after it, as in this Example.

```
  2346
   203
------
  7038
46920
------
476238
```

How to Prove your Multiplication.

First, Cast out 9 as often as you can out of your Multiplicand, and what remaineth set on one side of a Cross; as in the last Example, say, 2 and 3 is 5, and 4 is 9, and 6 which remains set down by the Cross.

```
6 X
```

Secondly, Then do the like by the Multiplier, saying, 2 and 3 make 5, which being less than 9, or more than 9, set on the other side of the Cross.

```
6 X 5
```

Thirdly, Multiply these two Numbers together, saying, 5 times 6 is 30, and cast away the nines thereof, saying, 3 times 9 is 27, which taken out of 30, and there rests 3, which you must set on the top of the Cross.

```
  3
6 X 5
```

Lastly, Cast away the nines out of the Product, and that which remains set at the bottom of the Cross, saying, 4 and 7 is 11, cast away 9 and there remains 2; then say, 2 and 6 is 8, and 2 is 10, cast away 9 and there rests 1; 1 and 3

```
  3
6 X 5
  3
```

is

is 4 and 8 is 12, cast away 9, there rests 3, which set at the bottom of the Cross; And now if the Figure on the top of the Cross and the Figure at the bottom of the Cross be both one and the same, as you see in this Example both fall out to be 3, then your Work is right.

Some prescribe to prove Multiplication by Division: but that is an harder Work than the former; and when you have done it, you had need to prove that again. So that you had as good run over your Multiplication again.

CHAP. V.

Of Division.

DIvision, or *Partition*, is, to seek how many times one Number doth contain another; or else, how often times one Number may be found in another: For in the Work of *Division* there are required two Numbers to be first known, for the finding out of the third. The first Number known is called the *Dividend*, or Number which is to be divided; and that must be the greater Number. The second Number is called the *Divisor*; and that is the lesser. And the third Number which I do seek is called the *Quotient*. As if I would divide 36 by 9, the *Dividend* shall be 36, and the *Divisor* 9: And because that 9 is contained in 36, 4 times; that is to say, 4 times 9 do make 36, the *Quotient* shall be 4.

The

The Practice.

1 Rule. Write down first the *Dividend* in the higher Line, and the *Divisor* underneath, in such sort, that the first Figure of the *Divisor* toward the left hand, be under the first Figure of the *Dividend*, and every Figure of the same *Divisor* under his like; that is to say, the first under the first, the second under the second, the third under the third; and so consequently of the other, if there be so many; which is contrary to the other kinds before specified.

2 Rule. But yet you must consider further, if all the lower Figures of the *Divisor* may be taken out of the higher Figures of the *Dividend*, by the Order of *Subtraction*, or not: The which if you cannot do, then must you set the first Figure of the *Divisor* a place forwarder (toward the left hand) under the second Figure of the *Dividend*; and so consequently the rest in their due order, if any be to be set down, every one of them under his like, as before is said: And then draw a Line between the *Dividend* and the *Divisor*; and at the end of them draw a little crooked Line, behind the which, toward the right hand, shall be set your *Quotient*. As by this Example following, where the *Divisor* is but of one Figure.

This is an old plain way of Division used by the Author, you shall see others afterward.

If you would divide 860 by 4, you must set down 4 under the 8, with a Line between them, as here under you may see.

The Dividend	860	(
The Divisor	4	

And

And then you muſt ſeek how many times the *Diviſor* 4 is contained in the higher Number, that is to ſay, in 860, the *Dividend* anſwering to it. Now though you cannot know this all at once, yet you may eaſily do it, by taking one Figure after another; and therefore you muſt firſt ſeek how many times 4 is contained in 8, in the which I find it 2 times; then I write down 2 apart behind the crooked Line, as here you ſee, which ſhall be the firſt Figure of the *Quotient* to come. Secondly, By this Figure 2 (being thus put apart) I muſt multiply the *Diviſor* 4, ſaying, 2 times 4 make 8, the which 8 I ſet under the *Diviſor* 4. Thirdly, I ſubtract the Product of the ſaid Multiplication (of the *Quotient* by the *Diviſor*) that is to ſay, 8 from the higher Number correſpondent to the ſame, in ſaying, 8 from 8 and there remaineth nothing, and then I cancel or ſtrike out that which is done, as you ſee. In theſe three Operations and Works is comprehended the Art of *Diviſion*: And they are to be obſerved from Point to Point; for there is no diverſity in the finiſhing of the ſame, which is thus. 3 Rule.

860 (2
~~4~~
~~8~~

Now ſecondly, I muſt remove my *Diviſor* one place neerer toward my right hand: 4 Rule.

As in proceeding with our Example, here you ſee I remove my *Diviſor* 4 which was under 8, and I ſet it under 6; then I ſeek how many times 4 is contained in 6, where I find it but one time, therefore I ſet 1 behind the crooked Line, next unto the firſt Figure of the *Quotient* 2,

860 (21
~~4~~4
~~8~~

a Degree or Place neerer my right hand: Afterward, by this last and new Figure 1, I multiply the *Divisor* 4, and that maketh but 4, (for an Unit, which is but 1, increaseth nothing) I abate therefore 4 from the higher Figure 6, and there resteth 2, the which 2 I set over the 6, and I cancel the 6; for so must I do when there resteth any thing after I have made the Subtraction.

```
  2
 860 (21
 44
 8
```

3 Rule. Thirdly, Forasmuch as there yet remaineth another Figure in the *Dividend*, I remove again the Divisor, and I set it under the Cypher 0. Then I seek how many times 4 is in the higher Number, which is 20, where I may find it 5 times; I put therefore 5 behind the crooked Line, for the third and last Figure of the *Quotient*; then by the same 5 I multiply the *Divisor* 4, and that maketh 20, the which 20 I abate from the higher Number 20, and there resteth nothing; and so is the *Division* ended. And thus I have found, that 860 being divided by 4, bringeth for the *Quotient* 215; that is to say, that 4 is contained in 860 two hundred and fifteen times.

```
  2
 860 (215
 --------
  4
 44
```

This is the most easie Working that is in *Division*; but that which followeth appertaineth to the whole and perfect understanding of the same.

8 Rule. When the first Figure of your *Divisor* toward your left hand is greater than the first of the *Dividend*, you must not place the first Figure

of your *Divisor* right underneath the first of the *Dividend*, but under the second Figure of the same *Dividend*, neerer to your right hand, as before is said. Therefore when the *Divisor* is of many Figures, and that you have to seek how many times it is contained in the higher Number (for the more easie Working) you must not seek to abate the *Divisor* all at one time; but you must see and mark how many times the first Figure of the same, toward the left hand, is contained in the higher Number answering to the said Number, and then to work after the same manner as is before taught.

Example. I have 316215 Crowns to be divided among 45 Men; and for to make my *Division*, I must not put the first Figure of the *Divisor*, which is 4, under the first of the *Dividend*, which is 3. because 4 is a greater Number than 3. And further you know, that I cannot take 4 out of 3; wherefore I must set the 4 under the second Figure of the higher Number, that is to say, under 1; and the Figure 5 of the *Divisor*, right under the 6, as here you may see.

316215
45

So that I must first seek how many times 45 is contained in 316, which is but a part of the *Dividend*: Where first, for the more easie working, I need but to seek how many times 4 is contained in 31. And because I may have it 7 times, I put 7 behind the crooked Line, as aforesaid; then by 7 I multiply all the *Divisor* 45, and they are 315: the which I set under the same *Divisor*, the first Figure under the first, and the other in order towards the left hand.

Then

Then I ſubtract 315 from the higher Number 316, and of this first Working there remaineth but 1, the which I ſet over the 6, and I cancel likewiſe the 315, and the other Figures 316, and alſo the *Diviſor* 45; and then it will ſtand thus, as in the Margent.

```
   1
 316215 (7
  45
 315
```

7 Rule. *Note*, It will be the beſt way in this manner of *Diviſion*, to write the Number to be ſubtracted, and the Number out of which it is to be ſubtracted, in a little piece of waſte Paper: So you may keep your Work the fairer, and order your placing your *Diviſor* again the better.

```
316
315
---
001
```

8 Rule. Now when you have cancell'd your *Diviſor* 45, and your *Dividend* 316, you muſt remove your *Diviſor* forwarder, which you muſt remember to place but one Figure forwarder at a time; which becauſe you cannot do in the ſame Line, when your *Diviſor* hath more Figures than one, you muſt ſet thoſe toward the left hand, in another Line underneath, and the laſt Figure in the former Line above, as in this Example; and ſo your *Diviſor* 45 will now ſtand thus under 12.

```
   1
 316215 (70
  455
   4
```

9 Rule. And when I have thus removed the *Diviſor*, if I ſee that I cannot find it one time there; that is to ſay, If the higher Number be leſſer than the *Diviſor*, as it is in this Example, then muſt I put a Cypher in the *Quotient* behind the crooked Line; and if there remain any Figures

in

in the *Dividend*, which are not yet finished, I must remove the *Divisor* again neerer toward my right hand by one place, for to find a new Figure in the *Quotient*. As in this Example: After that I have removed the *Divisor*, I seek how many times 45 is contained in 12; and because I cannot have 45 in 12, I put a 0 behind the crooked Line after 7: Then without multiplying or abating, I cancel this second *Divisor*, and remove it a place forwarder, according to the former Rules, and so my Work stands thus.

```
   1
 326215 (70
  4555
   44
```

And now my Work is, to find how many times 45 there is in 121, which is the Number over the *Divisor*; or working by the first Figure of my *Divisor*, I seek how many times 4 is in 12, which is the Number over 4: And whereas I find it 3 times, I put 3 behind the crooked Line, for the third Figure of the *Quotient*: Then by the same Figure 3 I multiply the *Divisor* 45, and thereof cometh 135, which I set down under the three first Figures which are not yet cancell'd; and I find in the three Figures over it but 121: so that I cannot take 135 out of that Number. 10 Rule.

```
   1
 326215 (703
  4555
   44
   135
```

And therefore here is to be noted, that if it happen, that the Figure being last found which is put in the *Quotient*, do produce or bring forth a greater Number (in multiplying all the *Divisor* by the same) than that which is over the said *Divisor*, you must then alter your last Figure 11 Rule.

gure of your *Quotient*, making the Figure of your *Quotient* (which you last put down) lesser by 1; and after that you have cancelled the first Multiplication, you must make a new: And the same must be done so often times, as (in decreasing the same) it may produce a lesser Number, or at the least, a Number equal to that which is over it: As in the last Work, because that the *Divisor* being multiplied by 3, bringeth 135, which amounteth to more than 121, therefore the same Product must be cancelled, and the Figure 3 which I did put in the *Quotient*, must also be changed into a Figure of 2. Then by the said 2, I must multiply the *Divisor* 45, and thereof cometh 90; the which I abate from 121, and there remaineth 31. And then will the Sum stand as in the Margent.

23
316215 (702
4555
44
90

12 Rule. And here also it is to be noted, That the Sum which remaineth after your Subtraction must be always lesser than the *Divisor*; and if it chance to be greater, you may be sure there is some errour, and you must begin your Work again.

Then finally, I remove the *Divisor* to the two next Figures towards my right hand, and I seek how many times 4 is in 31; and because I find it 7 times, I put 7 in the *Quotient*, by which I multiply the *Divisor*, and thereof cometh 315, the which I abate from the higher Number of the *Dividend*, and there remaineth nothing, as you may see.

23
316215 (7027
45555
444
315

But

But if it happen that after the *Division* is ended, there do remain any thing in the *Dividend*, as often times there doth, I must also set them that remain apart behind the crooked Line, after the entire *Quotient*, and the *Divisor* right under the same Remain, with a Line between them both: As in this Example, if the *Dividend* had been 316224, there would 9 remain; and so the *Quotient* would be $7027\frac{9}{45}$. 13 Rule.

$$\begin{array}{l} 23(9 \\ 316224\ (7027\frac{9}{45} \\ 45555 \\ 444 \\ 315 \end{array}$$

And what the same doth signifie, shall be taught unto you, when I shall treat of Fractions, or Broken Numbers.

A Second Way of Division.

This Way of *Division* used by our Author was an old, plain, common Way; which yet I have somewhat amended, and corrected many Faults. But there are other ways now more in use, which are more neat and brief, with a little more charge to the Memory.

Now not repeating the Rules before-shewed, which must still be observed, let this Number 978396 be divided by 321.

First, Set down the *Dividend*, and the *Divisor* under it, and draw the Line for the *Quotient*, as was shewed before; and then say, How many times 3 (which is the first Figure of the *Divisor*) is in 9, the Figure over it? And I see I may take it 3 times. Then for the Multiplying the *Divisor* by the *Quotient* 3, I begin first with the

the first Figure, saying, 3 times 3 is 9, which taken out of 9 the Figure over it, there remains 0, So I cancel the first Figure of the *Divisor* 3, and the first Figure of the *Dividend* 9.

	24
The Dividend	987396 (3
The Divisor	321

Then I come to the second Figure of the *Divisor*, and multiply that by the Figure of the *Quotient*, saying, 3 times 2 is 6, which taken out of 8 the Figure over it, there remains 2: So I cancel the second Figure of 2 in the *Divisor*, and the Figure of 8 over it in the *Dividend*, and write a Figure of 2 just over it.

Then I come to the third Figure of the *Divisor*, which is 1, and mul iply that by the Figure of the *Quotient*, saying, 3 times 1 is 3, which 3 taken out of the 7 over it, there rests 4: So I cancel the 1 and the 7, and write 4 over it. So the Work stands as abovesaid in the Example.

And now I must remove my *Divisor* a place forwarder, setting them as in the Example: And here I should see how many times I can take my *Divisor* 321 out of the Number over it, which is 243; but I see it cannot be taken out of it, because it is less: therefore I set a Cypher in the *Quotient*, and cancel the *Divisor*, and set it down again one place forwarder, as you see in the Margent.

24
987396 (3
3211
32

24
987396 (30
32211
322
3

And

And now I must find how many times 321 is in 2439; and to do this, first I say, How many times 3 (which is the first Figure of the *Divisor*) is in 24, which is over it? And I might take it 8 times; for 8 times 3 is 24: But then the next Figure 8 times 2 cannot be taken out of 3, therefore I take it but 7 times, saying, 7 times 3 is 21, which taken out of 24, there rests 3. So I cancel the Figure 3 in the *Divisor*, and the 24 in the *Dividend*, and set over it a Figure of 3.

```
  24
987396 (307
32221
 321
  3
```

```
  1
  3
 2492
987396 (307
32222
 322
  3
```

Then I come to the second Figure, and say, 7 times 2 is 14; 14 out of 33, and there remains 19: So I blot out the 2, and the 33, and write 19 over it.

Then I come to the last Figure of the *Quotient*, and say, 7 times 1 is 7, which taken out of 9, there rests 2.

And now I must again remove my *Divisor*, and so the Work will stand in this manner: So that I am to find how many times 321 is contained in 1916.

```
   1
   3
 2492
987396 (307
322221
 3221
  33
```

To do this, as before, first, I begin with the first Figure of the *Divisor*, saying, How many times 3 is in 19? And I find I may take it 6 times: So I write 6 in the *Quotient*, and then multiply thereby,

thereby, saying, 6 times 3 is 18; 18 out of 19, there rests 1; So I cancel the 3 and the 19, and write 1 over head.

Then I multiply the second Figure by 6, saying, 6 times 2 is 12: So I cross out the 2, and the 12 over it, and 0 rests.

Lastly, I say, 6 times 1 is 6, which taken out of 6, there remains 0. Thus this Division is finished, and I find that my *Divisor* is 3076 times in my *Dividend*, which may be proved by Multiplying the *Quotient* by the *Divisor*, and it will produce the Number of the *Dividend*, as at first 987396.

```
   1
   31
   2491
 987396 (3076
 321111    321
  3222    ----
   33     3076
          6152
          9228
         ------
         987396
```

A Third Way of Division.

There is yet somewhat a more curious and concise way of *Division*, much applauded by some; but it is a greater charge to the Memory; but for those who understand it well, and are much versed therein, it is very neat, and makes not so much cancelling of Figures: All the former Rules are to be used; only in this you begin at the other end of your *Divisor*. We will work over the same Example by it, and so you may see the better wherein they agree, and wherein they differ.

You must set the Sums as before.

The Dividend	987396 (3
The Divisor	321

Now

Now firſt conſider how many times 3 you can take out of 9, and that is 3 times; therefore ſet 3 in the *Quotient*: And now here is the difference, that you begin at the other end of your *Diviſor*, ſaying, 3 times 1 is 3; 3 out of 7, and there reſts 4; So you muſt cancel the Figure 1, and 7, and ſet 4 over its head.

```
  24
 987396 (3
 321
```

Then go to the middle Figure, ſaying, 3 times 2 is 6; 6 out of 8, and there reſts 2: So I cancel the 2 and the 8, and ſet 2 over its head.

Thirdly, Go the third Figure, and ſay, 3 times 3 is 9; 9 out of 9, and there reſts 0: Cancel the 3, and the 9, and the Work will ſtand as above written.

And thus having found the firſt Figure of the *Quotient*, you muſt ſet the *Diviſor* again as by the former Rules, and proceed to find another Figure; but becauſe you cannot take 321 out of 243, therefore you muſt ſet down a Cypher in the *Quotient*, and cancel this *Diviſor*, and ſet it down again a place forwarder: So the Work will ſtand thus.

```
  24
 987396 (30
 3221
  32

  24
 987396 (30
 32221
  321
   3
```

Now to find the third Figure of the *Quotient*, ſay, How many times 3 in 24? which you can take but 7 times, as before. Now mark this well; for in this is the chief trouble of the Work, when the Numbers grow great, in the borrowing, and carrying. Firſt begin with the laſt Figure of

your *Diviſor*, ſaying, 7 times 1 is 7; 7 out of 9, there reſts 2: So croſs out the 1 and the 9, and write 2 over the head of it.

```
      1
    2492
  987396 (307
   32111
    322
     3
```

Then multiply the middle Figure of your *Diviſor*, ſaying, 7 times 2 is 14; 14 out of 3 I cannot; but borrowing 20, or what you need, ſay, 14 out of 23, there remains 9: So I cancel the 2 in the *Diviſor*, and the 3 over it in the *Dividend*, and write 9 over its head, and carry the 2 or 20 that I borrowed to the next Figure.

Then ſay, 7 times 3 is 21, and 2 that I borrowed is 23; which 23 taken out of 24, there remains 1: So I cancel the 3, and the 24, and ſet 1 over it.

Now for the laſt Work, I ſet my *Diviſor* again, and ſee how many times 321 are in 1926, ſaying firſt, How many times 3 is in 19? which is 6 times; for 6 times 3 is 18: So I ſet 6 in the *Quotient*, and then multiply the *Diviſor* thereby, as before, beginning with the laſt Figure, ſaying, 6 times 1 is 6, which taken out of 6 over it, 0 remains: So I cancel the 1, and the 6, and ſet a 0 over it.

```
      1
    2492
  987395 (3076
   322111
    3222
     33
```

Then I multiply the ſecond Figure of the *Diviſor* by the ſaid 6, ſaying, 6 times 2 is 12; this 12 I cannot take out of the 9 over it, therefore I borrow 1, or 10, and ſay, 12 out of 12,

nd

and there rests 0: So I cancel the 2 in the *Divisor*, and the 2 above it, and set a 0 over it.

```
   100
  24920
 987396 (3076
 322221
  3222
   33
```

Lastly, I come to the first Figure of the *Divisor*, saying, 6 times 3 is 18, and 1 which I borrowed is 19, which taken out of 19, 0 remains: So I cancel the 3 of the *Divisor*, and the 19 over it, and set a 0 over it. So the *Division* is finished, which you may prove by *Multiplication*, as before.

And thus you have three of the best ways of *Division* which are used; and accordingly as you find them, you may make use of either of them. Often Practice will make either of them easie to you, though at first they seem somewhat difficult.

And therefore for the Encouragement of young Learners, to make the Work the more easie, I will also shew another manner of Working, very easie; the which shall serve for such *Divisions* as are more difficult to be wrought; that is to say, when the Number to be divided is very great, and the *Divisor* great also: and it shall serve also for to avoid Error in Supputation, and for the placing of fewer Figures in the *Quotient*; and consequently, it will save much labour unto them, which as yet have not much studied in this Art. The Practice thereof is as followeth.

If you would divide 7894658 by 643, First, you must understand, That although the Figure of the *Divisor* toward your left hand

may be found many times in the higher Number, as 10 times, 12 times, or more; yet it is ſo, that you muſt never put but one Figure only at a time in your *Quotient*. And you muſt at no time put any Number in your *Quotient* which exceedeth the Figure of 9; that is to ſay, any Number being greater than 9. And therefore, to come to the Practice; Write down your *Diviſor*, and multiply it by the 9 Digit Numbers in this manner.

Example, of the *Diviſor* propoſed 643. Firſt of all I write down 643; and right againſt the ſame, behind the Line towards my right hand, I put 1. Secondly, I double 643, and they make 1286; and right againſt that Sum, behind the Line, I put 2. Thirdly, Unto that ſame 1286 I add the *Diviſor* 643, and they are 1929; and right againſt the ſame I ſet 3. Fourthly, unto the ſaid 1929 I add the *Diviſor* 643, and they make 2572; and right againſt the ſame I put 4. And thus muſt you do always, adding the *Diviſor* at the top to the laſt Sum; which you may do as it ſtands at the top, or elſe write it in a little bit of Paper by it ſelf, and ſo hold it to every Sum.

643	1
1286	2
1929	3
2572	4
3215	5
3858	6
4501	7
5144	8
5787	9

Or elſe double the firſt Sum, that makes 2; then add the firſt and ſecond together, that makes 3; then double the ſecond Sum, that makes 4; then add the ſecond and third together, that makes 5; then double the third, that makes 6; then add the third and fourth together, that makes

makes 7; then double the fourth, that makes 8; then add the fourth and fifth together, that makes the ninth.

This being done, you must set down your *Divisor* under the *Dividend* 7894658, after the same manner as is before declared; that is to say, 643 under the 3 first Figures of the *Dividend* toward your right hand, namely, under 789. Then must you seek how many times 643 are contained in 789: And to know the same, you must look in the aforesaid Table, if you may there find the same Number 789, the which is not there; therefore you must take a lesser Number, the nearest to it in quantity that you can find in the Table, which is 643, which Number hath against it on the right hand of the Line this Digit 1. Then take the said 1, and put it behind the crooked Line, for the first Figure of the *Quotient*.

Then you must set this 643 directly under 789 and so abate 643 from 789, and there will remain 146, the which you must put over the 789, and cancel the 789, and thus is the first Work ended.

Then set forward the *Divisor*, one Figure neerer to your right hand,

555
17004
1468047
7894658 ($12277\frac{547}{643}$
6433333
64444.
666..

	Out of.	Rests.
643...	789	146
1286..	1464	178
1286..	1786	500
4591.	5005	504
4501	5048	547

rem. 547

7894658

and

and seek a new *Quotient* as you sought this, where you find the higher Number over your *Divisor* to be 1464. The which seek in the Table; and because you cannot find it there, you must take a lesser Number the nearest to it that you can find, and that is 1286, which Number hath against it this Digit 2; therefore you must put 2 for the second Figure of the *Quotient* behind the Line, and setting the said 1286 under 1464, abate the one from the other, cancelling the Figures as you go, and there will remain 178.

Thirdly, Remove forward the *Divisor* as you did before, and you shall find the higher Number over it to be 1786; so that the next lesser Number to it in your Table is again 1286; put therefore once again 2 in the *Quotient* for your third Figure, and abate the said 1286 from 1786, so there will remain 500.

Fourthly, Set forward the *Divisor*, and the higher Number over it is 5005, and the next lesser Number to it in your Table is 4501, right against the which is 7; put 7 in the *Quotient* for the fourth Figure; and after you have abated 4501 from 5005, there will remain 504.

Finally, Remove forward your *Divisor* unto the last place, and you shall find the higher Number over it to be 5048, and the next lesser Number to it in your Table is 4501; therefore set 7 again in the Quotient for the fifth and last Figure. Then subtract 4501 from 5048, and there will remain 547, which must be put at the end of the whole *Quotient*, with the *Divisor* under it, and a Line between them, in this manner. ($12277\frac{547}{643}$.

Take

Take notice here of these three things. First, You may see by this, that this way of multiplying your *Divisor* by the nine Digit Numbers may be of very good use, not only in this, but in all the former ways of *Division*; whereby you may certainly know how many times your *Divisor* is contained in your *Dividend*, and not run the danger of a Mistake, and so be forced to begin the Work again.

Secondly, If you place the Numbers found in this manner as I have shewed you, directly under the *Dividends*, setting Figure under Figure, according to their several Places and Powers, then your Work is made much more easie; for you have then nothing to do, but a plain subtracting of the two Numbers one from another, without any troubling of your Memory, as in the former Operations.

Thirdly, You shall this way have a more plain and easie proof of the truth of your Work, than any of the former ways; for if you add together these several Sums which you have subtracted, as they stand in their order, and also add the Remainer of the *Division* with them all together, (which in this Example is 547) if your Work be well done, they will (being added together, according to the common Rules of *Addition*) exactly make up the first Sum of the *Dividend*, which you see here is 7894658; which is a much more easie and plain proof of the Work, than to prove it by *Multiplication*, which is the surest and best way of proving any other way.

Yet some prescribe to prove *Division* by cast-

ing out the nines, after this manner. First, cast the nines out of the *Divisor*, which in this last Example is 6, 4, and 3, which make 13; So there rests 4, which set upon one side of a Cross.

2

4 X 1

2

Then cast the nines out of the *Quotient*, which is 12277, which makes 19: So 1 remains, which set on the other side of the Cross.

Then multiply these two Numbers together, which stand on each side the Cross, saying, 4 times 1 is 4; and then go to the Sum which remains upon the *Division*, 547, and joyn them together, casting out the nines, saying, 4 and 547 is 20, cast away two nines, there rests 2, which set on the head of the Cross.

Lastly, Cast out the nines out of the *Dividend*, and there you will likewise find 2 remaining, which you must set at the bottom of the Cross. And if these two Figures at the top and bottom of the Cross fall out both alike, then the *Division* is well done, otherwise not.

Rules to shorten Division.

When you would divide any Number by 10, you must take away the last Figure toward your right hand, and the rest shall be the *Quotient*.

Example. If you would divide 46845 by 10, take away the 5, by putting a crooked or *Quotient* Line between them thus, 4684(5; and then 4684 shall be the *Quotient*, and the 5 shall be the Number that doth remain. Likewise,

wise, when you would divide any Number by 100, take away the two last Figures towards your right hand; and if you would divide by 1000, take away three Figures; if by 10000, take away four Figures: And so of all other, when the first Figure of the *Divisor* toward the left hand shall be only 1, and the rest of the same *Divisor* be but Cyphers.

Likewise let your *Divisor* be what it will, if it hath one, two, three, or more Cyphers at the latter end, you may set the Cyphers at the end of the *Dividend*, and then work by the other Figures as if they were the whole *Divisor*, placing them as in this Example. So the two last Figures will be cut off from the *Dividend*, and will be part of a Fraction remaining after the *Division* is finished.

486456 (
36 00

CHAP. VI.

Of Reduction.

REduction sheweth how to reduce any kind of Money, Weights, or Measures, or any other thing, into its least or greatest parts which are in common use, which are called by other Names, or Denominations.

This is performed either by *Multiplication*, or *Division*. Thus to bring Pounds and Shillings into Pence and Farthings, you must do it by *Mul-*

Multiplication: for there are more pence and farthings in any sum of money, than pounds and shillings. But to bring pence and farthings into pounds and shillings, you must do it by *Division*, and so make a less number of them, and so for any other thing. I shall instance in some of the most usual and necessary; which will make the business more plain than many words.

Of English Money.

In one	Pound Shilling Peny	are	20 Shillings. 12 Pence. 4 Farthings.

Quest. How many shillings, pence, and farthings are in 100 pounds? Work by Multiplication after this manner.

First for the Shillings. If one pound hath 20 shillings, how many in 100 pounds. 100

Multiply 100 by 20 20

It shews the shillings are 2000. 2000

Secondly, for the Pence. Then multiply the shillings by 12 12

4000
2000

It shews the pence are 24000. 24000

Thirdly, for the Farthings. Lastly, multiply the pence by 4 4

It shews the farthings in the said 100 *l.* 96000

Quest. In 96000 farthings how many pence, shillings and pounds? Work by Division after this manner. First, divide the farthings by 4, to bring them into pence; then divide the pence by 12, to bring them into shillings; then divide

vide the shillings by 20, to bring them into pounds.

z	q.	d.	sh.	l.
96000 (	24000 (	2000 (	100	
4	12	20		

But in this work of Reduction many times you need not run through all the several Denominations, but joyn 2 or 3 in one, and so come to the thing you desire the sooner.

As if you would find how many farthings are in 100 pounds.

First multiply 100 pounds	100
by 20 shillings	20
It shews the number of shillings	2000
Then multiply this by 48	48
knowing there are 48 farthings in	16000
one shilling	8000
It shews as before	96000

the number of the farthings in 100 *l.*

So if the Question were, How many pounds in 96000 farthings? Divide first by 48, and so make shillings, then by 20 bring it into pounds.

q.	sh.	l.
96000 (	2000 (	100
48	20	

There are other Denominations of money used here and beyond the Seas, the way to reduce them into pounds, shillings, and pence, is to bring them into their lowest Denominations, and then into what you desire.

Quest. In 2000 thirteen pence half-penies, how many pounds, shillings, and pence?

First,

First, to bring the 2000 thirteen pence half-penies into half-pence, multiply them by 27, because there are so many half-pence in thirteen pence half-peny, so they make 54000 half-pence.

2000
27
54000

Then because 24 half-pence are in a shilling, divide the said 54000 by 24, and afterward by 20, and it shews the shillings and pounds.

	sh.	l.	sh.
2			
62	1		
54000	(2250	(112	10
24444	2200		
222			

In 112 *l.* 11 *s.* 1 *d.* ½ how many 4 *d.* ½?

	112
	20
	2240
add 11 *s.*	11
shill.	2251
half-p.	24
	9004
	4502
	54024

9 half-pence in 4 *d.* ½.

54027 (6003
9999

In 1000 Dollers at 4 *s.* 4 *d.* how many pounds, shillings, pence?

13 groats in a Doller.

1000
13
groats 13000

3 groats in a shilling.

222
13000 (4333⅓
3333

	l.	s.	d.
21			
4333⅓ (	216	13	4
2220			

Or

Or else you may more readily bring shillings into pounds, thus, Cut off the last figure and take half of the rest, saying, the half of 4 is 2, the half of 3 is 1, the half of 13 is 6, and one remaining, which with the Figure cut off, makes 13 shillings, and the $\frac{1}{3}$ of a shilling is 4 pence, so the sum is 216 pounds, 13 shillings, and 4 pence.

433	3	$\frac{1}{3}$
216	13	4

Of Weight.

The Weights used among us are of two sorts, the one is called *Troy* weight, with which Gold, and Silver, and Bread is weighed: the other is called *Avirdupoise*, with which most other Commodities are weighed.

In *Troy* weight, one grain of Wheat taken out of the midst of the ear makes a grain, 24 grains make a peny-weight, 20 peny-weights make an ounce, and 12 ounces make one pound, so there are 480 grains in an ounce, and 240 peny-weights in the pound.

Avirdupoise weight hath 16 ounces in the pound, but the ounce is somewhat lighter than the *Troy* ounce; 13 ounces *Avirdupoise* making but 12 ounces *Troy* weight, and this ounce is divided into halves and quarters, and each quarter into 4 drams; And this is the least proportion usual of these sorts of weights.

But in weighing of great things, though these weights are called by the name of hundreds, halves and quarters; yet an hundred weight is 112 *l.* and an half hundred 56 *l.* and a quar-

ter

ter 28 *l.* which is also called a Tod, and the half thereof is 14 *l.* called in some places a Stone, and the half thereof is 7 *l.* and then for conveniency of weighting, a 4 *l.* a 2 *l.* and 1 *l.* and so the half-pound, and quarter of a pound ; and so by these few weights they can weigh any number of pounds, from one to an hundred.

In the using of these weights, when they weigh Commodities by them, which are reckoned by hundreds, quarters, and halves, which are called gross weights, it is sometimes necessary to know, how many pounds neat or subtle, are in any number of gross weights, which is thus performed.

In 56 *C.* $\frac{1}{2}$ $\frac{1}{4}$ how many single pounds?

	112
	56 *C.*
	672
	560
$\frac{1}{2}$ *C.*	56
$\frac{1}{4}$ *C.*	28
	6356

In 56 *C.* Tare 12 *l.* *per C.* How many pounds neat?

Gross.	*Tare.*
112	56 *C.*
56	12 *l.*
6272 *in all.*	112
672 *Tare.*	56
Subtr.	
5600 *Neat.*	672
	Tare in all.

Tare is the allowance for the Weight of the Bag, Chest, or Barrel wherein any Commodity is put.

Tret is an allowance of 4 *l.* to every 100 *l.* that is 104 for 100.

In

In 56 *C.* groſs weight,
Tare 12 *l. per C.* Tret 4 *l. per C.*
How many pounds Neat?

First find the Tare.

56 *C.*
Tare 12 *l. per C.*
———
112
56
———
Tare 672 *in all.*
———
Groſs 56 *C.*
by 112
———
Groſs 6272 *in all.*
———
Tare 672 *Subtr.*
———
reſts 5600 *l. Subtle.*

Then out of the groſs ſubtract the Tare: So there reſts the Pounds ſubtle.

Then, *As* 104 *to* 100 : *So* 5600 *to* $5384\frac{64}{104}$.
Multiply by 100
———
560000

Divide by 104.

46
48884 *l.*
560000 ($5384\frac{64}{104}$ *neat.*
104444
1000
11

Or elſe, having the pounds ſubtle, to find the pounds neat, becauſe 4 *l.* is the 26th part of 104, divide

divide the pounds subtle by 26, and what you find in your Quotient shall be the Tret, which must be subtracted out of the pounds subtle, So you shall have the pounds neat remaining.

	21	
	44	*Tret.*
Pounds	5600	(215 $\frac{10}{26}$
subtle.	2666	
	22	

Pounds subtle	5600
Tret subtract.	215 $\frac{10}{26}$
Rests pounds neat as before.	5384 $\frac{16}{26}$

Note here in reckoning up your Tret, if you should abate 4 *l.* for every 100 *l.* so 56 times 4 *l.* would be 224 *l.* which would be almost 9 *l.* loss to the seller: there is so much difference between giving 104 *l.* for 100 *l.* and abating 4 *l.* for every 100 *l.* The true way therefore of casting up the Tret, is to reckon 104 *l.* for 100 *l.* or by subtracting the 26th part, as I have here shewed, both which waies come to one.

And now knowing how many pounds you are to pay for, and what you are to pay for the pound, you may soon cast up what you are to pay for the whole parcel by the former Rules of Reduction of Money.

Reduction of Measure in length.

This round Globe of Earth and Sea, commonly called the World, is in compass 360 degrees, and each degree contains about 60 miles, and each mile 8 furlongs, and each furlong 40 poles, and each pole 5 yards and an half or 11 half-yards, and each yard 3 foot, and each foot 12 inches

inches, and each inch 3 barly-corns. Now how many Barly-corns, Inches, Feet, Yards, Poles, Furlongs, and Miles will reach about the World?

First, the whole Compass is	360	*Degrees.*
Each Degree	60	*Miles.*
The Number of the Miles	21600	
Each Mile	8	*furlongs.*
The Furlongs	172800	
Each Furlong	40	*Poles.*
The Poles	6912000	
Each Pole 5 Yards and ½ or 11 half Yards.	11	½ *Yards.*
	6912000	
	6912000	
half of this	76032000	
The Yards	38016000	
Each Yard 3 feet	3	*feet.*
The Feet	114048000	
Each foot 12 inches	12	
	228096000	
	114048000	
The Inches	1368576000	
Each Inch 3 Barly-Corns	3	

The Barly-Corns 4,105,728,009, which will reach about the World.

Meaſures for Corn.

One	Quarter	of Corn is	8 Buſhels.
	Buſhel		4 Pecks.
	Peck		2 Gallons.
	Gallon		8 Pints.

Suppoſe a Servant to an Husbandman agreed with his Maſter to ſerve him 7 years, upon condition that his Maſter ſhould find him ground and tillage to ſow one pint of wheat the firſt year, and ſo to continue ſowing all the increaſe thereof for the whole ſeven years. Now I demand how many Buſhels and Quarters might reaſonably come of this pint of wheat in the ſaid ſeven years, allowing a tenfold increaſe every year, which is as little as can be imagined?

According to which Suppoſition, the firſt year the increaſe was 10 *pints.*

The ſecond year	100
The third	1000
The fourth	10000
The fifth	100000
The ſixth	1000000
The ſeventh	10000000

24
Divide this 10000000(1250000
by 8 888
It ſhews the Gallons.

Divis

1
Divide the Gallons 1250000(625000
by 2 222
It shews the Pecks.

2012
Divide the Pecks 625000(156250
by 4 44444
It shews the Bushels.

7401(2
Divide the Bushels 156250(19531
by 8 88888
It shews the Quarters.

Being 19531 Quarters and 2 Bushels; very good wages for his 7 years service.

Reduction of wet Measures.

There are four measures used for wet things, the Pint, the Quart, the Pottle, the Gallon. The Gallon seems to be the prime and principal measure, the Pottle is half thereof, the Quart is a quarter thereof, and a Pint the eighth part thereof: so that in a Gallon there are 8 Pints, 4 Quarts, and 2 Pottles.

Other things are rather Vessels to hold liquor, than to measure it.

But yet there is much difference between the Ale or Beer Gallon, and the Wine Gallon, the Wine Gallon being much less, *viz.* as 5 to 4.

Beer Vessels are thus called and hold,

	Pints.	*Quarts.*	*Pottles.*	*Gallons.*
A Barrel	288	144	72	36
A Kilderkin	144	72	36	18
A Firkin	72	36	18	9

Ale Vessels are somewhat less.

	Pints.	Quarts.	Pottles.	Gallons.
A Barrel	256	128	64	32
A Kilderkin	128	64	32	16
A Firkin	64	32	16	8

Wine Vessels with their Contents.

	Pints.	Quarts.	Pottles.	Gallons.
A Tun is	2016	1008	504	252
A Pipe or But	1008	504	252	126
A Punchion	672	336	168	84
An Hogshead	504	252	126	63
A Terce of a Pipe	336	168	84	42
An half-Hogshead	252	126	63	31½
A Rundlet	144	72	36	18

Note, Whereas a Tun contains 252 Gallons, yet by reason of the Lees and Dregs Vintners use to reckon but 240 Gallons in the Tun, and so there being 240 pence in a pound or 20 shillings, every peny a Gallon is 20 shillings the Tun, and every pound paid for the Tun, is so many pence for the Gallon: so 48 *l.* the Tun is 48 pence or 4 shillings the Gallon.

CHAP.

Of Progreſsion.

CHAP. VII.

PRogreſſion is of two ſorts. 1. *Arithmetical Progreſſion.* 2. *Geometrical Progreſſion.*

Progreſſion Arithmetical is commonly defined (according to its plain and common uſe) to be a brief and ſpeedy aſſembling or adding together of divers Figures or Numbers, every one ſurmounting the other continually by equal Difference, as 1, 2, 3, 4, 5, *&c.* Here the Difference from the firſt to the ſecond is but of 1, and ſo do all the other every one exceed his former Figure by 1 ſtill to the end. Likewiſe, 2, 4, 6, 8, *&c.* do proceed by the difference of 2. Alſo 3, 6, 9, 12, *&c.* do every one differ from other by 3. And ſo may theſe numbers continue infinitely after this order, by adding the common Difference between the former Numbers, to all the following Numbers. And if you obſerve this order you may readily make a Table of Multiplication after this manner, every line being but a continual Addition of the firſt Number thereof, to the following Numbers, take it either ſidewaies or down-right.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

The first Rule or Use in Progression.

Now the first Rule or Common Use of *Progression Arithmetical* is somewhat more readily and artificially to sum up and find the Total Sum of any Number of Numbers proceeding by *Arithmetical Progression*, which is thus to be performed.

First, tell how many Numbers there are, and write their sum down by it self, as in this Example, 2, 5, 8, 11, and 14, where the Number of their places are 5, as you may see. Therefore you must set down 5 in a place alone, as I have done here in the Margin. Then shall you add the first Number and the last together, which in this Example are 14 and 2, and they make 16, take half thereof which is 8, and multiply it by the 5 which I noted in the Margin, for the number of the places. And the sum which amounteth of that Multiplication, is the Total Sum of those

5
8
——
40

those Figures added together. As in this Example, 8 multiplied by 5 makes 40, and that is the total Sum of all the Figures.

1 *Quest.* A Clock striking round 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, how many strokes doth it strike in all? In this Question you must likewise note down the number of the places, as before is taught, and then add together the last number and the first: and the Sum which cometh of that Addition, shall you multiply by half the number or the places which before are noted, and that which resulteth of the said Multiplication, is the whole Sum of all those strokes, as in this Example, where the Number of the places are 12, I note the 12 apart, and then I add 12 and 1 together, which are the last and first numbers, and they make 13, which I multiply by 6, which is half the number of places, and they make 78, and to so much amount all those figures added together.

A second sort of Questions or Rule in Arithmetical Progression, is by the first Number, the Number of places, and the common Excess, to find the last Number, without proceeding by continual Addition, and so more readily to find the total Sum of all the Numbers, which is performed in this following Question.

A Merchant hath sold 100 Kersies after this manner following, that is to say, the first piece for 1 *s*, the second piece for 2 *s.* and so forth, rising 1 *s.* in every piece of Kersie unto the hundredth piece. The Question is to know, how much he shall receive for the said 100 pieces of Kersies?

Answ. It behoveth you to know the Addition of the 100 terms in this Progression: And therefore you must add 1 *s.* which is the price of the first piece with 100, which is the price of the last piece, and thereof cometh 101, the same 101 you must multiply by half the number of places, that is to say, by 50, and thereof cometh 5050 *s.* which being divided by 20 *s.* thereof will come 252 *l.* 10 *s.* which is 2 *l.* 10 *s.* 6 *d.* a piece one with another. Thus the 100 Kersies are sold by the said Merchant for 252 *l.* 10 *s.* The Practice followeth.

```
100
  1
----
101          x (1        l.   sh.
 50          5050 (252   10
----         2222
5050
```

Another Question of the same sort.

I would lay 100 Stones (or Eggs rather, for the Stones may be thrown in short, but the Eggs will break if not laid in gently) in a right Line, and every of the said Stones to be a just yard one from another, and one yard from off the first Egg or Stone there stands a Basket, I demand how many yards a man shall go in gathering up the said Eggs or Stones, and bearing them unto the Basket one after another?

Answ. First, when he fetcheth the first Egg or Stone and putteth it into the Basket, he goeth

2 yards

2 yards, for the second 4 yards, for the third 6 yards, for the 4th. 8, and so forth unto the last Egg or Stone: wherefore the last term shall be 200, unto the which you must add the first term, which is 2, and they make 202, wherefore the half is 101, which you shall multiply by 100, which is the number of the terms in your Progression; or else multiply 202 by 50, which is half the number of paces, and thereof will come 10100 yards, and so many yards shall he go in all, which is 5 miles 3 quarters wanting only 20 yards of *English* measured miles having 1760 yards in each mile.

Now there being a mutual Proportion between these 5 things, the first and last Numbers, the total Sum, the common Excess, and the Number of the places, any three of these things being known, the rest may be found out; and so you may make many Varieties of Questions, which are resolved by understanding the former Rules.

As for Example.

1. By the first and last Number, and the total Sum, to find the Number of the places.

Rule. In the former Question of the 100 Eggs the first term being 2, and the last 200, these two added together make 202, with which divide the total Sum which is 10100, so you shall have 50 in the Quotient, which is just half the Number of the places.

2 *Variety.* By the first and last Number, and the common Excess, to find the Number of places.

Rule. From the last Number in the foresaid Example of the Eggs, which was 200, take the first

first Number, which is 2, there rest 198, which divide by the common Excess 2, there comes in the Quotient 99, to which add 1, and it makes 100, which is the Number of the places.

3 *Variety.* By the first and last Number, and the Number of places to find the common Excess.

Rule. In the former Example, from the last Number 200 take the first Nnmber 2, there remains 198, then from the Number of places, which was 100, take 1, there remains 99, by which divide 198, the Quotient will be 2, which is the common Excess.

4 *Variety.* The total Sum being given, and the first and last Numbers, to find out the Number of the places.

Rule. In the former Example, add the first Number 2 to the last Number 200, they make 202, by which divide the Total Sum 10100, the Quotient is 50, which is half the Number of the places, which doubled make 100.

5 *Variety.* The total Sum being given, and the first and last Numbers, to find the common Excess.

Rule. Find the Number of places as in the 4th. Rule, then by the 3d. you may find the common Excess.

6 *Variety.* The total Sum being given, the common Excess, and the Number of the places, to find out the first and last Numbers.

Rule. By the Number of the places, which in the former Example were 100, divide the total Sum 10100, the Quotient will be 101, which

which doubled makes 202, which is the first and last Number joyned together. Then by a Number less by 1 than the Number of the places, which is 99, multiply the common Excess 2, it makes 198, which subtract from the first doubled Quotient 202, there remains 4, the half being 2 is the first Number, and then this subtracted from the said 202, which was the first and last joyned in one shews the last Number to be 200.

7 *Variety.* The Excess being given, and the first or last Number; to know the Quantity of any middle Number, whose place is given from the first or the last Number.

1	2	3	4	5	6	7	8	9
8	16	24	32	40	48	56	64	72
9	8	7	6	5	4	3	2	1

Example. In this Progressive Number, 8, 16, 24, *&c.* the common Excess being 8, to find the sixth Number from the first, or the sixth from the last.

Multiply the Excess 8 by a Number less by one, than the Number of the place desired, which in this Example being 6, you must multiply 8 by 5, and it makes 40, to which add the first Number 8, it makes 48, for the sixth Number from the first, as you may see by the row of Numbers over the Progression.

But if you would find the sixth Number from the last, multiply as before the Excess 8 by the Number of the place desired wanting one, that

is

is 8, by 5 makes 40, which subtracted from the last Number 72, there remains 32, for the sixth Number from the last, as you may see by the Row of Figures under the Progression.

These are most of the Varieties and Rules shewed in Arithmetical Progression by other Authors, which they confess are but of little use, I shall now proceed to give you some Questions of another nature.

A Third Sort of Questions in Arithmetical Progression.

There is a Messenger, which goeth every day 8 miles, another man followeth him incontinently, and he goeth the first day 1 mile, the second day 2 miles, the third day 3 miles, and so increasing his Journey, every day one mile by natural Progression. The Question is to know in how many daies the second man shall have overtaken the first?

Answ. To resolve this Question you must know that 8 the Number given is the middle or half as well of the terms, as of the number of the daies, and therefore double 8, and thereof cometh 16, subtract 1, and there will remain 15: and in so many daies shall he have overtaken the first Messenger, in the which time they will both of them travel 120 miles outright. But if the second had gone the first day 2 miles, the second 4 miles, the third day 6 miles, and so increasing every day his Journey by 2, in how many daies should he have overtaken the first man? To do this you must perceive that 4 is the middle and fourth

fourth term. Therefore double 4 and they make 8, from the which subtract 1, and there remaineth 7, and in so many daies he should have overtaken him, having travelled 56 miles.

4. *Question of Progression Arithmetical.*

There is one man departeth from *London* to *Chester* and so to *Carnarvan*, the distance being about 200 miles: he goeth the first day 1 mile, the second day 2 miles, the third day 3, and so orderly by natural Progression; Another man departeth at the same instant from *Carnarvan* to *London*, and goeth the first day 2 miles, the second day 4 miles, the third day 6 miles; and so increasing every day 2 miles. The Question is, to know in how many daies these two persons shall meet together?

Answ. First, you must consider, that he which goeth by Progression natural, maketh but half the way the other doth, so that he shall have made but the one third part of the way at their meeting together. Take therefore the $\frac{1}{3}$ part of 200, and you shall have $66\frac{2}{3}$. Then you must seek 2 Numbers, whereof the greater may be double unto the other less one, and that one of them being multiplied by the other, the Product of them may be $66\frac{2}{3}$ or little more, so that the more do not exceed the value of the greater term, as here in this Question, the 2 neerest Numbers are 12, and $6\frac{1}{12}$ which multiplied the one by the other, do make 78, which is $11\frac{1}{3}$ more than $66\frac{2}{3}$, wherefore that day when they should meet together, the first had gone but $\frac{2}{3}$ of a mile of his

Journey, which was upon the 12 day: then if you will know what part of the day they did meet, you must divide $\frac{2}{3}$ by 12, and you shall find $\frac{1}{18}$ of a day. Therefore in 11 daies and $\frac{1}{18}$ part of a day, that is upon the 12 day they shall meet together.

5. *Question.*

If a man do owe unto me 1000 Crowns to be paid in 20 daies, or terms by Arithmetical Progression. The Question is to know with what Number he shall begin and continue his Progression?

Answ. To do this you must add 1 unto 20, and they make 21, which you shall multiply by 10, which is half the Number of the places, and thereof cometh 210, and therefore divide 1000 by 210, and thereof will come $4\frac{16}{21}$, the paiment of the first day, and by this Number doth the said Progression increase in this sort following: $4\frac{16}{21}$ $9\frac{11}{21}$ $14\frac{6}{21}$ $19\frac{1}{21}$, &c. which reduced is $\frac{100}{21}$ $\frac{200}{21}$ $\frac{300}{21}$ &c. So the 20th. and last paiment is $\frac{2000}{21}$ and the whole $\frac{21000}{21}$ which reduced into whole Numbers is 1000 as at first.

6 *Question.*

A man oweth me 400 *l.* to be paid in 10 years by Progression Arithmetical, that is to say, 40 *l.* at the end of the first year, and every year following 40 *l.* to the end of 10 years: he offereth to pay me the said 400 *l.* all at one paiment.

The

The Question is to know, at what time he ought to pay me the same at one paiment, that I be not interessed in the time? "These kind of Questions about Equations of paiments do not so "properly belong to Progression, but yet they are "of more frequent and necessary use than most of "the other Questions; and the way to resolve "them here shewed is very plain and easie, and as "exact as most of the ordinary Rules shewed by "others agreeing exactly with the Interest of the "Money, though not with the Rebate, which "is the more exact way, as you shall see here-"after.

Now the way to answer such Questions is thus. Add 1 to the Number of the terms which are 10, and they make 11, wherefore you must take the half, that is to say $5\frac{1}{2}$: therefore he must pay me at 5 years and $\frac{1}{2}$ the said 400 *l.* all at one time; for that which he payeth before, is equal to that which remaineth unpaid. This Rule holdeth though the time be propounded in other Denominations, as if the paiments were to be made monethly, 40 *l.* every Moneth for 10 Moneths, then the whole 400 *l.* should be paid at 5 Moneths and an half. If the paiment should be 40 *l.* for every six Moneths or every half-year; then the whole paiment of 400 *l.* should be made at 5 half years and $\frac{1}{2}$, that is at 2 years, one half, and 3 Moneths. So for quarters of years, or any other times propounded.

But here note, if it happen that the last paiment be lesser than the others, you must in this case put the last paiment over one of the others to make thereof a Fraction, which must be added unto

unto the Number of the terms, and the half of the said Sum being taken shall shew the time that the said paiment ought to be paid at once; As if the said party did owe me but 380 pounds, to be paid every year 40 *l.* it is certain that he must have 10 years to end the paiments. And And it is true, that upon the 10th. day there would remain but 20 *l.* to be paid. And therefore put 20 over 40 in this sort $\frac{20}{40}$ and that maketh $\frac{1}{2}$, which you shall add unto the Number of terms, and you shall have $10\frac{1}{2}$, whereof the half which is $5\frac{1}{4}$ doth shew that he must pay the said 380 *l.* at 5 years $\frac{1}{4}$ all at one paiment, and so of all such like.

Of Progression Geometrical.

Progression Geometrical is, when the second Number containeth the first in any proportion, as 2, 3, or 4 times, and so forth. And in like proportion shall the third Number contain the second, and the fourth Number contain the third, and the fifth the fourth. As 2, 4, 8, 16, 32, 64, here the proportion is double.

Likewise, 3, 9, 27, 81, and 243, are in triple proportion.

And 2, 8, 32, 128, and 512, are in proportion quadruple.

That is to say, in the first Example where the proportion is double, every Number containeth the other 2 times, as 4 containeth 2 two times: 8 containeth 4 two times, &c. In the second Example of triple proportion, the Numbers exceed each other 3 times. And in the third Example the Numbers exceed each other 4 times and thus you see that

Progression Arithmetical differeth from *Progression Geometrical*; for in *Progression Arithmetical*, the Excess is only added to the former Number, but in *Geometrical Progression*, the foregoing Number is still multiplied by the Excess.

Now if you will easily find the Sum of any such Numbers, you shall do thus, consider by what Number they be multiplied, whether they be multiplied by 2,3,4,5, or any other Number: and by the same Number you must multiply the last Sum in the Progression; and from the product of the same Multiplication, you shall abate the first Number of that Progression, and that which remaineth of the said Multiplication, you shall divide by 1 less than was the Number by which you did multiply, and the Quotient shall shew you the Sum of all the Numbers in any Progression. As in this Example, 5, 15, 45, 135, and 405; which are in triple proportion. Now multiply 405, which is the last Number, by 3; because they are in triple proportion: and they are 1215, from which you shall abate the first Number of the Progression, which is 5, there remaineth 1210; which you shall divide by a Number less by one than that was by which you did multiply, that is to say by 2, and you shall find in the Quotient 605: which is the total Sum of the Numbers of that Progression. Likewise 4, 16, 64, 256, and 1024, which are in proportion quadruple: therefore you shall multiply 1024, by 4, and there will come 4096, from which abate the first Number 4, and there will remain 4092, which you must di-

divide by 3, and you shall find in your Quotient 1364: which is the total Sum of that Progression.

A Question of Progression Geometrical.

A Merchant hath sold 15 yards of Satten, the first yard for 1 *s.* the second 2 *s.* the third 4 *s.* the fourth 8 *s.* and so increasing by double Progression Geometrical. The Question is to know how much the said Merchant shall receive for the said 15 yards of Satten?

Answ. First, it is needful to know how much the whole Numbers of the said Progression do amount unto together. And to do that there are two waies; the one at Length, by setting down the several Sums, 1, 2, 4, 8, 16, 32, 64, 128, &c. till you come to the 15th. Sum, and then adding them all together by the Rules of common Addition: Or else by multiplying the last Sum by the Excess, &c. as in the former Rule.

But if the places are many, and you would make somewhat shorter work, reckon to about an half or a quarter of the places, and multiply the Number of the place you leave off at by it self, and that shall be the Number belonging to double the Number of the places lacking 1. As in this Example, set down the said Progression unto the 8th. term, which is 128, then multiply this Number by it self, it makes 16384, which is the 15th. Number, that is the double term to 8 lacking 1. Now having thus found the last Number, to cast up what this and all the

the other Numbers come to, because the Progression is made by 2, multiply this Number 16384 by 2, and it makes 32768, from which abate the first Number of the Progression which was 1, and there remains 32767; which is to be divided by a Number less by 1, than the common Excess; but the said Excess being 2, take 1 from it, there remains but 1, which doth neither multiply nor divide. So the Sum of all the 15 terms is 32767, and so many shillings do the 15 yards of Satten come to, which is 1638 *l.* 7 *s.* in the whole, and 109 *l.* 4 *s.* 6 *d.* *fere*, for every yard thereof, which is a very dead peny-worth: I will therefore see if I can help you to a better Bargain to make you amends.

A Gentleman having a very good Gelding, which his Neighbour had a mind to, only he thought he asked too dear for him, being merry together, saith the owner of the Horse to the other, for once I will make a mad Bargain with you, and sell you a royal Peny-worth, I will also give you good time for the paiment of the Money; for you shall pay me only some small matter every week, for this half-year, *viz.* the first week you shall pay me only a farthing, the second week but 2 farthings, the third week 4 farthings, and so double your paiment every week, till the half year be out. The other Gentleman, not well considering of the increase of the paiments at the latter end, accepted of the Bargain. Now let us cast it up for them, to see what the price of the Horse came to, and so judg of the Bargain.

To Cast it up, first you must consider that

in half a year there are 26 weeks, and the paiment is to be 1 farthing the firſt week, 2 the ſecond, 4 the third, 8 the fourth 16 the fifth, 32 the ſixth, and 64 the ſeventh week; and ſo you might go on to the 26th. week. But to ſhorten the work, being come to the ſeventh week, which paiment is to be 64 farthings, multiply this in it ſelf, and it produceth 4096 which is the paiment for the 13th. week, being the double of 7 lacking one. Likewiſe multiply this Number 4096 by it ſelf, and it makes 16777216 for the paiment of the 25th. week, which is the double of 13 lacking 1, now the paiment of the 26th. week muſt be double to this, which is 33554432, and the total Sum of all the paiments will be double to this laſt paiment abating the firſt Number 1, So all the paiments will amount to 67108863 farthings, which reduced into Shillings and Pounds makes 69905 *l.* 1 *s.* 3 *d.* 3 *q.* So that I fear the Horſe did prove a very dear Bargain. The proof hereof you may make by ſetting down the ſeveral weeks at large, and ſumming them up, either by the Rules of Progreſſion, or by the common Rules of Addition.

$$
\begin{array}{r}
64 \\
64 \\
\hline
256 \\
384 \\
\hline
4096 \\
\end{array}
\qquad
\begin{array}{r}
4096 \\
4096 \\
\hline
24576 \\
36864 \\
163840 \\
\hline
16777216 \\
\end{array}
$$

CHAP.

1	1
2	2
4	3
8	4
16	5
32	6
64	7
128	8
256	9
512	10
1024	11
2048	12
4096	13
8192	14
16384	15
32768	16
65536	17
131072	18
262144	19
524288	20
1048576	21
2097152	22
4194304	23
8388608	24
16777216	25
33554432	26
67108863	*Sum.*

CHAP. VIII.

Of the Rule of Three, called the Golden Rule: or the Rule of four Proportionals.

THe Rule of Three, is the chiefest, the most profitable, and the most excellent Rule of all the Rules of Arithmetick. For all other Rules have need of it, and it useth all the other, for the which cause it is said, that the Philosophers did name it the Golden Rule. And after others Opinions and Judgments it is called the Rule of Proportion of 4 Numbers. But now in these latter daies by us it is called, The Rule of Three; because the manner of working therewith, is alwaies by three Numbers which are known, to find out a fourth Number which is yet unknown.

Now this fourth Number is found out by the proportion that it hath to the other Numbers; for look what proportion the first Number hath to the second, the same proportion will the third have to the fourth. As for Example, let the Numbers be set thus,

	first		*second*		*third*		*fourth*
If	1	cost	2 *s.*	then	2	will cost	4 *s.*
	2		4 *s.*		8		16 *s.*
	3		9 *s.*		9		27 *s.*

In

In these small Numbers the proportion is plain and visible. But now to find out those which are harder, you must work thus, according to the common way, which is the best in this business. Set the 3 known Numbers in a streight Line, as in the foresaid proportions, with two or three words expressing the Question briefly; then multiply the second and third Number together, and divide the product thereof by the first Number: so your Quotient will shew you the Number proportional thereunto, which is the Number desired to be known.

For Example take this Question, which I shall set down several waies, that you may see how this Rule works the proportion forward and backward, giving more or less in the fourth Number, yet still proportionably to the Question, which is best to be laid down in the third Number with the word How or What, or such like.

If 80 yards cost 120 *s.* what 140 *yards*?

120
2800
140
16800

s.
16800 (210
8880

Answ. 140 *yards* will cost 210 *s.*

If 140 *yards* cost 210 *s.* what 80 *yards*?

80
16800

2
16800 (120 *s.*
14440
11

Answ. 120 *s.*

If 120 *s.* buy 80 *yards*, what 210 *s.*

80

1
16800(140 *yards.* 16800
122
11

Answ. 140 *yards.*

If 210 *s.* buy 140 *yards*, what 120 *s.*

120

2800 16800 (80 *yards.*
140 2210
2

16800

There are ſome other waies of working this Rule, but they are more proper for Fractions, In this way the chief thing is to have a care that your firſt and third Numbers be of one and the ſame Denomination, as Pounds, Shillings, Pence, Yards, Ells, or whatever elſe it be.

And therefore if they be not of one and the ſame Denomination, you muſt bring them to one and the ſame by Reduction.

As in this Example following.

If 12 Nobles do gain me ſix *French* Crowns, how many *French* Crowns will 48 pounds gain me? Here you ſee that the Denomination of the firſt Number is Nobles, and the Denomination of the third is Pounds: wherefore before you do proceed to work by the Rule of 3, you muſt firſt turn the pounds into Nobles by multiplying 48 pound by 3, and they make 144 Nobles, for there is in every pound of Money 3 Nobles: or otherwiſe, if you will, you

you may bring the first Number being 12 Nobles into Pounds by dividing them by 3, and thus shall your first and third Numbers be brought into one Denomination: then shall you set down your 3 Numbers in order, thus,

	Nobles.		*Crowns.*		*Nobles.*	*Crowns.*
If	12	gain	6:	what	144	72.
	2				6	
	864(72				———	
	122				864	
	1					

That is, if 12 Nobles do gain me 6 *French* Crowns, what shall 144 Nobles gain? the which 144 Nobles are in 48 *l.* Then multiply the third Number 144, by the second Number 6, and thereof cometh 864, which you must divide by 12 Nobles, and thereof cometh 72 *French* Crowns. And so many *French* Crowns will the 144 Nobles gain.

This Rule of Three is one of the most necessary Rules of all other, and is not only to be used in these single Operations, but many times must be repeated several times, to find out several Sums, as thus,

Three Merchants buy a Bargain, which comes to 1098 *l.* and because they have not all ready money to lay down share-like equally, therefore they are content to lay down each man what he can, and according to the Sum each man laies down, so to have a proportional share of the profit. The first man could lay down but 183 *l.* The second could lay down but 366 *l.* And the third man laid down the rest, which

was

was 549 *l.* Now they shortly after sold this Bargain again for 1464 *l.* now the Question is, how much each man is to have of this 1464 *l.* proportionably according to the money laid down by them?

Here you see the Bargain cost 1098 *l.* and was sold for 1464 *l.* and the first man laid down only 183 *l.* to find his Share, according to the Rules, do thus,

If 1098 *l.* produce 1464 *l.* what 183 *l.*

```
        1464
         183
        ----
        4392
       11712      267912 (244
       1464       1098
       ------
      267912
```

Multiply 1464 by 183, it makes 267912, which divided by 1098 yields 244 *l.* for the first mans share.

Then for the second mans share, who paid in 366 *l.*

If 1098 *l.* produce 1464 *l.* what 366 *l.*

```
        1464
         366
        ----
        8784
       8784       535824 (488
      4392        1098
      ------
      535824
```

So the second man is to have 488 *l.*

Lastly,

Lastly, for the third man, who paid 549 *l.*
If 1098 *l.* produce 1464 *l.* what 549 *l.*

```
549
------
13176
5856          803736 (732
7320          1098
------
803736
```

So the third mans share is 732 *l.*

And for proof hereof, add the three Sums together, and they make up the whole, both of the money paid, and also to be shared.

1	paid	183 *l.*	is to receive	244 *l.*
2		366 *l.*		488 *l.*
3		549 *l.*		732 *l.*
		1098		1464

And so it will be also in case of loss, or of any other Division, as you shall see more in Fractions.

The Backer Rule of Three.

The Backer Rule of Three is so called, because it produceth and requireth a proportion quite backward and contrary to the Rule of Three direct. For in the direct Rule of Three, the greater the third Number is, so much the greater will the fourth be. But here in this Backer Rule it is contrariwise; for the greater the third Num-

Number is, so much the lesser will the fourth be. Also whereas in the Rule of Three direct, the third Number is multiplied by the second, and the Product thereof divided by the first: here you must multiply the second Number by the first, and divide the Product thereof by the third, and the Number which cometh in the Quotient answereth to the Question: for such Practice cometh oftentimes in use, in such sort, that if you should work the same by the Rule of Three direct, and not have a regard unto the Proportion of the Question, you should then commit an evident and open Error.

Example.

If 15 shillings worth of Wine will serve for the ordinary of 46 men, when the Tun of Wine is worth 12 pounds, for how many men will the same 15 shillings worth of Wine suffice, when the Tun of Wine is worth but 8 pounds? It is certain, that the lower the price is, that the Tun of Wine doth cost, so many more Persons will the said 15 shillings in Wine suffice. Therefore set down your Numbers thus, If 12 pounds suffice 46 men, how many men will 8 pounds suffice? You must multiply 46 by 12, and thereof cometh 552, which you shall divide by 8, and thereof cometh *69*, and unto *69* men will the said 15 shillings worth in Wine suffice, when the Tun of Wine is worth but 8 pounds, as hereafter doth appear by the working thereof.

2. Like-

l.	*Men.*	*l.*
12	46	8
	12	
	92	7
	46	552 (69
	552	88

2. Likewise a Messenger maketh a Journey in 24 daies, when the day is but 12 hours long: In how many daies shall he make the same Journey, when the day is 16 hours in length? Here you may perceive that the more hours there are in a day, the fewer daies the Messenger will be in going his Journey. Therefore write down your Numbers thus, as here you see.

Hours.	*Daies.*	*Hours.*
12	24	16
	12	12
	48	288 (18 *daies.*
	24	166
	288	1

And then multiply 24 daies by 12 hours, and thereof cometh 288: divide the same 288 by the third Number 16, and you shall find 18, which is 18 daies, and in so many daies will the Messenger make his Journey, when the day is 16 hours long.

Likewise when the Bushel of Wheat doth cost

cost 5 shillings, the peny wheaten Loaf of bread weigheth 11 ounces.

I demand what the same peny Loaf shall weigh when the Bushel of Wheat is worth but 4 shillings? Here is to be considered, that the better cheap the Wheat is, the heavier shall the peny Loaf weigh, and therefore write down your 3 Numbers thus,

sh.	ounces.	sh.	ounces.
5	11	4	$13\frac{3}{4}$
	5		
		13	
	55	55 ($13\frac{3}{4}$	
		44	

CHAP. IX.

Of the double Rule of Three, or the Rule of Three composed, which is distinct into four Rules, each of them differing the one from the other.

THE Rule of Three composed is so called, because it is a composing or joyning of two Questions or Operations of the common Rule of Three into one, which many times serves for the shortening of the work. Now as in the Rule

Rule of Three, there is the Direct Rule and the Reverse or Backer Rule: So here also the two Questions may require either a direct proportion, or a reverse proportion, or one part may be direct, and the other reverse, and so require somewhat a different Operation according to these Rules.

There belongs to this Rule alwaies 5 Numbers, the first three contain a Supposition, the two last a Question, to which the Number found, or sixth Number must be the Answer.

First, in the Rule Direct.

The Question being made, the five Terms or Numbers given must be so placed, that the first and the fourth may be of one and the same Denomination, the second and the fifth of another: (but like to one another) And the Answer in the sixth the same with the third: and then the manner of Operation must be thus.

You must multiply the first Number by the second, and that shall be your Divisor, then multiply the other three Numbers the one by the other to be your Dividend. 1 Rule.

Example of this first part, if 100 Crowns in 12 Moneths do gain 15 *l.* what will 60 Crowns gain in 8 Moneths? *Answ.* First multiply 100 Crowns by 12 Moneths, and thereof cometh 1200 for your Divisor, then multiply 15 *l.* by 60 Crowns, and by 8 Moneths, and you shall have 7200; wherefore divide 7200 by 1200, and thereof cometh 6 *l.* so many pounds will 60 Crowns gain in 8 Moneths.

Crowns.

Crowns.	Moneths.	Pounds.	Crowns.	Moneths.
100	12	15	60	8
	100			60
	1200			480
				15
				2400
	7200 (6 l.			480
	1200			
				7200

This might also be done at two Operations by the Rule of 3 Direct, but this is somewhat more brief.

If 100 *Cr.* gain 15 *l.* what 60 *Cr.* *Answ.* 9 *l.*
If 12 *Mo.* gain 9 *l.* what 8 *Mo.* *Answ.* 6 *l.*

2. In the second part of the Rule of Three composed the third Number is like unto the fift, whereof the Rule is thus.

2 Rule. You must multiply the third Number by the fourth, and the Product shall be your Divisor, then multiply the first Number by the second, and the Product thereof by the fift, which Number shall be your Dividend, or Number that is to be divided; as by Example.

When 60 Crowns in 8 Moneths do gain 6 *l.* in how many Moneths will 100 Crowns gain 15 *l.* *Answ.* Multiply the third Number 6 by the fourth Number 100, and thereof cometh 600, which shall be your Divisor: then multiply the first Number 60, by the second Number 8, and the Product thereof by the fift Number 15, and thereof will come 7200; then divide 7200 by 600, and the Quotient will be

be 12, in so many Moneths will 100 Crowns gain 15 *l.*

Crowns.	*Moneths.*	*Pounds.*	*Crowns.*	*Pounds.*
60	8	6	100	15
	60	100		
	480	600		
	15			
	2400			
	480		1	*Answ.*
			7200(12 *M.*	
	7200		6600	

This Question may also be resolved at two Operations, the one by the Rule of Three Reverse, the other by the Rule of Three Direct. thus,

If 60 *Cr.* require 8 Moneths, what 100 *Cr.* *Answ.* 4 Moneths, 80 parts.

If 6 *l.* require 4 Mon. 80 parts, what 15 *l.* *Answ.* 12 Moneths.

In the third part of the Rule of Three composed, there may be 5 Numbers, or more: and in this Rule the first Number and the last are alwaies different, and of unlike Denomination, the one to the other; and the Question is from the last Number unto the first, whereof the Rule is thus. You must multiply that Number which you would know by those Numbers which do give the value, and divide the Product of the same by the Multiplication of the Numbers which are already valued, as by Example, If 4

Deniers of *Paris* be worth 5 Deniers *Tournois*, and 10 Deniers *Tournois* be worth 12 Deniers of *Savoy*, I demand how many Deniers of *Paris* are 8 Deniers of *Savoy* worth?

Answ. Multiply 8 Deniers of *Savoy* (which is the Number that you would know) by 4 Deniers of *Paris*, and by 10 Deniers *Tournois*, which are the Numbers that give the value, and they make 320: then multiply 5 Deniers *Tournois* by 12 Deniers of *Savoy*, which are the Numbers already valued, and they make 60; finally, divide 320 by 60, and you shall find 5 Deniers $\frac{1}{3}$ of *Paris*, so much are the 8 Deniers of *Savoy* worth.

Paris.	*Tournois.*	*Tournois.*	*Savoy.*	*Savoy.*
4 *d.*	5 *d.*	10 *d.*	12 *d.*	8 *d.*
			5	4
			60	32
				10
				320

Answ.
320 (5$\frac{1}{3}$
60

You may do this also by the Rule of Three at two Operations, thus.

	Tournois.		*Paris.*		*Tournois.*		*Paris.*
As	5 *d.*	*to*	4 *d.*	*So*	10 *d.*	*to*	8 *d.*

Now 10 *d.* *Tournois* being equal to 12 *Sav.*

	Savoy.		*Paris.*		*Savoy.*		*Paris.*
As	12 *d.*	*to*	8 *d.*	*So*	8 *d.*	*to*	5$\frac{1}{3}$ *d.*

In the fourth part of the Rule of Three composed

posed, the first Number and the last are alwaies of one kind and Denomination, and the Question of this Rule is alwaies from the last Number to that last saving one, whereof there is a Rule, which is thus: You must multiply the Number, which you would know, by the Numbers that are already valued, and divide the Product of the same by the Multiplication which cometh of the Numbers that give the value, as by Example.

If 4 Deniers of *Paris* be worth 5 Deniers *Tournois*, and 10 Deniers *Tournois* be worth 12 Deniers of *Savoy*: I demand how many Deniers of *Savoy* are 15 Deniers of *Paris* worth?

Answ. Multiply 15 Deniers of *Paris* that you would know by 5 Deniers *Tournois*, and by 12 Deniers of *Savoy*, which are the Numbers already valued, and they make 900; divide the same by 4 times 10, which are the Numbers that do give the value, that is to say, by 40, and you shall find 22 Deniers ½ of *Savoy*: so much are the 15 Deniers of *Paris* worth.

Paris.	*Tournois.*	*Tournois.*	*Savoy.*	*Paris.*
4 *d.*	5 *d.*	10 *d.*	12 *d.*	15 *d.*
10				5
—				—
40				75
				12
				——
				150
~~2~~2 *Answ.*				75
~~9~~~~0~~0 (22 ½				——
~~44~~0				900

 This

This also may be performed at two Operations by the Rule of Three: thus,

Tour.	*Par.*	*Tour.*	*Par.*
As 5 *d.*	*to* 4 *d.*	*So* 10 *d.*	*to* 8 *d.*

Now 10 *d. Tour.* being equal to 12 *d. Savoy*, and so found to be equal to 8 of *Paris.*

Paris.	*Savoy.*	*Paris.*	*Savoy.*
As 8 *d.*	*to* 12 *d.*	*So* 15 *d.*	*to* $22\frac{1}{2}$ *d.*

CHAP. X.

Of Interest, Simple and Compound, of Purchases, Reversions, Rebate, and Equation of Payments.

THis Rule of Three composed is very good in Questions of Interest, which our Author having not meddled with, I shall a little apply thereunto.

Let the Question be this. If the Interest of 100 *l.* for 12 Moneths is 6 *l.* then what is the Interest of 50 *l.* for 8 Moneths?

This and such Questions, as I said before, require two several Operations by the common Rule of Three after this manner.

First, If 100 *l.* require 6 *l.* what 50 *l.*
Answ. 3 *l.*
Secondly, If 12 Moneths give 3 *l.* what 8 Mo.
Answ. 2 *l.*

But

But now this Rule joyns both together after this manner.

Pounds.	*Moneths.*	*Interest.*	*Pounds.*	*Moneths.*
100	12	6 *l.*	50 *l.*	8
	100			50
	1200			400
				6
	$\cancel{2}\cancel{4}00$ (2 *l.*			
	$\cancel{1}\cancel{2}00$		*Answ.* 2 *l.*	2400

And the way of working it is thus, multiply the first and second Numbers together, which here make 1200, this must be your Divisor.

Then multiply the three other Numbers one by the other, so they make 2400. This must be your Dividend.

Now divide this 2400 by 1200, and the Quotient will be 2 *l.* which answers the Question as before.

Now in the use of this Rule to avoid Fractions, and to find the exact Interest of any Sum of Money not only in Monethѕ but in Daies, you may work thus,

Reduce the 6 *l.* Interest into shil. and pence.

20	
120	*Shillings.*
12	
240	and
120	
1440	*Pence.*

And

And the Year hath 365 Daies, 6 hours: but to allow rather more than less, you may reckon 366 daies.

Now let your Question be, what is the Interest of 50 *l.* for 30 Daies at 6 *l. per C. per An.* Set the Question thus,

Pounds.	*Daies.*	*Interest.*	*Pounds.*	*Daies.*
100	366	1440 *d.*	50	30
	100	50		
	36600	72000		
		30		
		2160000		

36
6366
21600 | 00 (59 *d.*
3666 | 00
36

Answ: 59 *pence.*

That is 5 shillings wanting one peny, or a very little more. And thus you may do, let the Sum of Money be what it will, with a very little more trouble, As in this Question.

What is the Interest of 645 pounds for 90 Daies?

Set the Question thus,

Pounds.

Pounds.	Daies.	Interest.	Pounds.	Daies.
100	366	1440	645	90
	100		90	
	36600		58050	
			1440	
			2322000	
			232200	
			58050	
			83592000	

```
 ~~13~~
 ~~365~~
 ~~4044~~
 ~~10196~~
 ~~113742~~
 ~~835920~~ | 00 (2283 224/366
 ~~366666~~ | 00
  ~~3666~~
   ~~33~~
```

That is 2283 *pence* $\frac{2}{3}$.

which reduced into shillings and so into pounds makes 9 pounds, 10 shillings, and 3 pence $\frac{2}{3}$.

```
 ~~1~~          sh.  d.
 ~~2283~~ (190   3   2/3
 ~~1222~~
  ~~11~~
```

That is 9 *l.* 10 *s.* 3 *d.* $\frac{2}{3}$.

If you desire not to be so exact as to account for the Interest in Daies, but in Moneths: Then first for the Interest of any Sum for the whole year, work thus,

As 100 *l. to* 6 *l. So the Sum propounded to the Interest thereof for a year.*

As 100 *l. to* 6 *l. So* 645 *l. to* 38 *l.* 70 *parts.*

6

38,70

Which being divided by 100, by cutting off the two laſt Figures, ſhews the Intereſt thereof comes to 38 *l.* and 70 hundred parts of a pound, which is the Intereſt of the ſaid Sum for the whole year.

Now if you would find the Intereſt of this Sum for 3 Moneths as before: then take a quarter of this Sum, it is *967$\frac{1}{2}$*, which, cutting off the two laſt Figures, ſhews 9 pounds, *67$\frac{1}{2}$* parts.

272
3870(9 *l.* 67$\frac{1}{2}$.
444

Now to reduce this Decimal Fraction into Shillings and Pence. If you have not a Table ready to do it by, Firſt, multiply it by 20, to bring it into ſhillings, ſo cutting off the two laſt Figures it is 13 ſhillings, 50 parts. Then multiply this 50 by 12, it makes 600, which cutting off the two laſt Figures, ſhews 6 pence, ſo the Intereſt by this account comes to *9 l.* 13 *ſh. 6 d.* If any thing had remained you might have multiplied it by 4, and ſo brought it into Farthings.

But the other way by Daies is more exact, for the Moneths are unequal, and you ſee by the former way, that for 90 Daies, which many times make 3 Moneths time, the Intereſt of this Sum comes but to *9 l.* 10 *s.* 4 *d.* which here comes to *9 l.* 13 *s.* 6 *d.*

67$\frac{1}{2}$
20
——
13,50
——
50
12
——
100
50
——
6,00

You may work thus alſo, when your Sum conſiſts of pounds, ſhillings and pence. As if you deſire to know the Intereſt of 644 *l.* 19 *s.* 6 *d.* for an whole year.

As

As 100*l.* *to* 6*l.* *So* 644*l.* 19 *sh.* 6 *d.*
First multiply this by *6.* 6

6 six pences are		3	0
6 times 19 *s. are*	5	14	0
6 times 644 l. *is*	3864	00	0
In all	38,69	17	0

	69	17
	20	
13	97	
	12	
1	94	
9	7	
11	64	
	4	
2	56	

Cut off the two first Figures of the pounds, and it is 38 *l.* 69 17, that is *ferè* 70 parts, which make 38 *l.* 14 *s.* *ferè.*

For take this 69 17, and multiply the 69 by 20, and add the 17*s.* to it, and it yields 13 *s.* 97 *parts,* then cutting off the two first Figures, multiply the 97 by 12 to find the pence ; So it yields 11 *d.* 64 *parts.* Lastly, multiply this 64 by 4, to find the Farthings, it makes 2 *q.* 56 *parts,* which is an half. So the whole Sum reduced is 38 *l.* 13 *s.* 11 *d.* 2 *q.* $\frac{1}{2}$ *q.* which is very near 38 *l.* 14 *s.* the Interest of 645 *l.* as before. But to know the Interest of any Sum of Money more readily, you may make use of this Table, wherein there is no difficulty, only take notice, that for the more exactness in the smaller Sums, the peny is divided into 100 parts, So you may reckon 25 parts for one Farthing, 50 parts for an half-peny, and 75 for 3 Farthings.

A Table of Interest at 6 *l.* per Cent.

		1 Day.			2 Daies.			4 Daies.			7 Daies.			10 Daies.			20 Daies		
		s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.
shill.	5			1			2			4			7			10			19
	10			2			4			8			13			20			39
	15			3			6			12			20			30			59
pounds.	1			4			8			15			27			39			78
	2			8			16			31			57			78		1	57
	3			12			24			47			82		1	18		2	36
	4			15			31			63		1	10		1	57		3	15
	5			19			39			78		1	38		1	97		3	94
	6			23			47			94		1	65		2	36		4	73
	7			27			55		1	10		1	93		2	76		5	52
	8			31			63		1	26		2	21		3	15		6	31
	9			25			71		1	42		2	48		3	55		7	10
	10			39			78		1	57		2	76		3	94		7	89
	20			79		1	58		3	15		5	52		7	89	1	3	78
	30		1	18		2	36		4	73		8	28		11	83	1	11	67
	40		1	58		3	15		6	31		11	4	1	3	78	2	7	36
	50		1	97		3	94		7	89	1	1	80	1	7	72	3	3	45
	60		2	36		4	73		9	46	1	4	57	1	11	67	3	11	34
	70		2	76		5	52		11	4	1	7	33	2	3	61	4	7	23
	80		2	15		6	31	1	0	62	1	10	9	2	7	56	5	3	12
	90		3	55		7	10	1	2	20	2	0	85	2	11	50	5	11	1
	100		3	94		7	89	1	3	78	2	3	61	3	3	45	6	6	90
	200		7	89	1	3	78	2	7	56	4	7	23	6	6	90	13	1	80
	300		11	83	1	11	67	3	11	34	6	10	84	9	15	35	19	8	71
	400	1	3	78	2	7	56	5	3	12	9	2	96	13	1	80	26	3	61
	500	1	7	72	3	3	45	6	6	90	11	6	8	16	5	26	32	10	52
	600	1	11	67	3	11	34	7	10	68	13	9	69	19	8	71	39	5	42
	700	2	3	61	4	7	23	9	2	46	16	4	31	23	0	16	46	0	32
	800	2	7	56	5	3	12	10	6	24	18	4	93	26	3	61	52	7	23
	900	2	11	50	5	11	1	11	10	2	20	8	54	29	7	6	59	2	13
	1000	3	3	45	6	6	90	13	1	80	23	0	16	32	10	52	65	9	44

A Table of Interest at 6 *l.* per Cent.

		1 Mon.			2 Month.			3 Month.			6 Month.			9 Month.			12 Mon.		
		s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.	s.	d.	c.
shill.	5			30			60			90		1	80		2	70	0	3	60
	10			60		1	12		1	80		3	60		5	40	0	7	20
	15			90		1	18		2	70		5	40		8	10	0	10	80
pounds.	1		1	20		2	40		3	60		7	20	0	10	80	1	2	40
	2		2	40		4	80		7	20	1	2	40	1	9	60	2	4	80
	3		3	60		7	20		10	40	1	9	60	2	8	40	3	7	20
	4		4	80		9	60	1	2	40	2	4	80	3	7	20	4	9	60
	5		6	00	1	0	0	1	6	0	3	0	0	4	6	0	6	0	0
	6		7	20	1	2	40	1	9	60	3	7	20	5	4	80	7	2	40
	7		8	40	1	4	80	2	1	20	4	2	40	6	3	60	8	4	80
	8		9	60	1	7	20	2	4	80	4	9	60	7	2	40	9	7	20
	9		10	80	1	9	60	2	8	40	5	4	80	8	1	20	10	9	60
		l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
	10		1	0		2	0		3	0	0	6	0	0	9	0	0	12	0
	20		2	0		4	0		6	0	0	12	0	0	18	0	1	4	0
	30		3	0		6	0		9	0	0	18	0	1	7	0	1	16	0
	40		4	0		8	0		12	0	1	4	0	1	16	0	2	8	0
	50		5	0		10	0		15	0	1	10	0	2	5	0	3	0	0
	60		6	0		12	0		18	0	1	16	0	2	14	0	3	12	0
	70		7	0		14	0	1	1	0	2	2	0	3	3	0	4	4	0
	80		8	0		16	0	1	4	0	2	8	0	3	12	0	4	16	0
	90		9	0		18	0	1	7	0	2	14	0	4	1	0	5	8	0
	100		10	0	1	0	0	1	10	0	3	0	0	4	10	0	6	0	0
	200	1	0	0	2	0	0	3	0	0	6	0	0	9	0	0	12	0	0
	300	1	10	0	3	0	0	4	10	0	9	0	0	13	10	0	18	0	0
	400	2	0	0	4	0	0	6	0	0	12	0	0	18	0	0	24	0	0
	500	2	10	0	5	0	0	7	10	0	15	0	0	22	10	0	30	0	0
	600	3	0	0	6	0	0	9	0	0	18	0	0	27	0	0	36	0	0
	700	3	10	0	7	0	0	10	10	0	21	0	0	31	10	0	42	0	0
	800	4	0	0	8	0	0	12	0	0	24	0	0	36	0	0	48	0	0
	900	4	10	0	9	0	0	13	10	0	27	0	0	40	10	0	54	0	0
	1000	5	0	0	10	0	0	15	0	0	30	0	0	45	0	0	60	0	0

Use

Use of these Tables.

If your Sum of Money or Time be the same with any in the Table, then the Table plainly shews the Interest thereof for that time. But if you cannot find it at once, you must part your Money or Time into 2 or 3 parts, and so find it out.

Thus to find the Interest of 645 *l.* for a year.

		l.	*s.*	*d.*
600 *l.*	for a year comes to	36	0	0
40 *l.*		2	8	0
5 *l.*		0	6	0
	In all	38	14	0

Of Interest upon Interest.

To know the Interest upon Interest for any Sum of Money, you must first cast up what the Interest is for the first year, then adding that to the Principal, find what the Interest thereof is for the next year, and so for the next, or for the odd Moneths.

For Example. What is the Interest of 100 *l.* for two years and an half reckoning Interest upon Interest.

First, 100 *l.* for one year yield 6 *l.* Interest, which makes it 106 *l.* then for the next year, say 100 *l.* 6 *l.* 106 *l.*

6

6 | 36

which

which is 6 *l.* and 36 parts over, which added to the former Sum 106 *l.* makes it 112 *l.* 36 parts.

Then to find the Interest of this for half a year more, work by half a years Interest.

As 100 l. *to* 3 l.	*So* 112 l.	36 *parts.*	
	3		
yields more for the half-year	3	37	8
which added to the former	112	36	
makes in all	115 *l.*	73	parts.
which reduced		20	
Shillings	14	60	
		12	
	1	20	
	6	0	
Pence	7	20	
		4	
ferè 1 *q.*		80	

You may more easily reduce this by the Table of reduction of money, which you shall have in reduction of Fractions.

But these Questions of Interest upon Interest, which for many years require many several works, may be best resolved by some such Table as this following.

A Table

Use of these Tables.

If your Sum of Money or Time be the ſame with any in the Table, then the Table plainly ſhews the Intereſt thereof for that time. But if you cannot find it at once, you muſt part your Money or Time into 2 or 3 parts, and ſo find it out.

Thus to find the Intereſt of 645 *l.* for a year.

		l.	*s.*	*d.*
600 *l.*	for a year comes to	36	0	0
40 *l.*		2	8	0
5 *l.*		0	6	0
	In all	38	14	0

Of Intereſt upon Intereſt.

To know the Intereſt upon Intereſt for any Sum of Money, you muſt firſt caſt up what the Intereſt is for the firſt year, then adding that to the Principal, find what the Intereſt thereof is for the next year, and ſo for the next, or for the odd Moneths.

For Example. What is the Intereſt of 100 *l.* for two years and an half reckoning Intereſt upon Intereſt.

Firſt, 100 *l.* for one year yield 6 *l.* Intereſt, which makes it 106 *l.* then for the next year, ſay 100 *l.* 6 *l.* 106 *l.*

6

6 | 36

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		12	
	1	20	
	6	0	
Pence	7	20	
		4	
ferè 1 *q.*		80	

You may more easily reduce this by the Table of reduction of money, which you shall have in reduction of Fractions.

But these Questions of Interest upon Interest, which for many years require many several works, may be best resolved by some such Table as this following.

A Table

A Table ſhewing what one Pound or twenty Shillings will amount to at any time under 21 years, reckoning Intereſt upon Intereſt at 6 per Cent.

The Term of Years.	*l.*	*s.*	*d.*	*q.*	*Decimals.*
1	1	1	2	2	1, 06000
2	1	2	5	2	1, 12360
3	1	3	9	3	1, 19101
4	1	5	3	0	1, 26248
5	1	6	9	0	1, 33822
6	1	8	4	2	1, 41852
7	1	10	0	3	1, 50363
8	1	11	10	2	1, 59385
9	1	13	9	2	1, 68948
10	1	15	9	3	1, 79085
11	1	17	11	2	1, 89830
12	2	0	3	0	2, 01219
13	2	2	7	3	2, 13293
14	2	5	2	2	2, 26090
15	2	7	11	1	2, 39656
16	2	10	9	2	2, 54035
17	2	13	10	1	2, 69277
18	3	17	1	0	2, 85434
19	3	0	6	0	3, 02560
20	3	4	1	3	3, 20714
21	3	7	11	3	3, 39956

By this Table you may readily know the increaſe of any other Sum for any years under 21: for if the Intereſt of 1 *l.* comes to ſo much as the Table ſhews; then the Intereſt of 5 *l.* will come to 5 times as much, and ſo for any other Sum: ſo that if you multiply either the pounds, ſhillings,

shillings, and pence by your Number of pounds, or if you multiply the Decimal Number by the Number of pounds, the Product will shew the increase. Thus if you would know the increase of 75 *l.* in 20 years. The Table shews that 1 *l.* in 20 years yields 3 *l.* 4 *s.* 1 *d.* 3 *q.*

Then reckon 75 times so much for the 75 *l.* thus	75 *l.*			
75 times 3 *l.* is	225			
75 times 4 *s.* is 300 *s.* or	15			
75 pence is	0	6	3	
75 times 3 *q.* is	0	4	8	1
In all	240	10	11	1

If you work by the Decimals, then the Table shews that 1 *l.* in 20 years increaseth to 3,20714
This multiplied by the 75 *l.* 75

1603570
2244994

yields 240,53510

Which reduced by the Table makes 240 *l.* 10 *s.* 8 *d.* 2 *q.* the same to a small matter with the other, only a little more exact, because the Farthings cannot be so exactly proportioned as the Decimals are.

Of Annuities, Reversions, and Purchases.

To know what any Sum of Money to be received any Number of years hereafter is worth in ready Money, reckoning Interest upon Interest.

Add the Rate of the Interest to 100 *l.* and work by the Rule of Three, thus,

At

As 106 l. *to* 100 l. *So* 100 l.
100

1
34 16
1466 116 ——
10000 000 10000 (94 *l.* 339 *parts.*
10660 666
100 00
11 1

Thus you see 100 *l.* to be paid at 1 years end is worth in ready money but 94 *l.* 339 *parts*, or 6 *s.* 8 *d.*

Then for the second year take this Sum last found, and say,

As 106 *l.* *to* 100 *So this* 94339
100

11 ——
1000 9433900
1955566
9433900 (88,999
1066666
10000
111

So that 100 *l.* to be paid at the end of two years is worth but 89 *l.*

And thus you should do from year to year. But because this is some trouble, I shall give you a Table ready calculated shewing the worth of 1 *l.* to be paid any Number of years under 31, by which you may cast up what any other Sum of Money is worth at the same rate.

Lastly, If the several Sums of this Table be added together year after year, they will make another very profitable Table, shewing the true value of any Purchase to continue any Number of years.

What

What 1 l. to be paid any number of years hence is worth in ready Money at 6 per Cent.

years.	*sh.*	*d.*	*q.*	*Decimals.*
1	18	10	2	.94339
2	17	9	2	.88999
3	16	9	2	.83962
4	15	10	0	.79209
5	14	11	1	.74726
6	14	1	1	.70496
7	13	3	2	.66506
8	12	6	2	.62741
9	11	10	0	.59190
10	11	2	0	.55839
11	10	6	2	.52678
12	9	11	1	.49697
13	9	4	2	.46884
14	8	10	0	.44230
15	8	4	1	.41726
16	7	10	2	,39365
17	7	5	0	.37136
18	7	0	0	.35034
19	6	7	1	.33051
20	6	2	3	.31180
21	5	10	2	.29415
22	5	6	2	.27750
23	5	2	3	.26180
24	4	11	1	.24698
25	4	7	2	.23300
26	4	4	3	.21981
27	4	1	3	.20737
28	3	11	0	.19563
29	3	9	1	.18453
30	3	5	3	.17411

What 1 l. Annuity to continue any time under 31 years is worth in ready Money at 6 per Cent.

years.	*l.*	*sh.*	*d.*	*q.*	*Decimals.*
1	0	18	10	2	0.9434
2	1	16	8	0	1.83339
3	2	13	5	2	2.67301
4	3	9	13	2	3.46510
5	4	4	3	0	4.21236
6	4	18	4	1	4.91732
7	5	11	7	3	5.58238
8	6	4	2	1	6.20979
9	6	16	0	1	6.80169
10	7	7	2	1	7.36008
11	7	17	8	3	7.88687
12	8	7	8	0	8.38384
13	8	17	0	2	8.85268
14	9	5	10	3	9.29498
15	9	14	3	0	9.71224
16	10	2	1	2	10.10589
17	10	9	6	2	10.47725
18	11	16	6	2	10.82780
19	11	3	2	0	11.15811
20	11	9	4	3	11.46992
21	11	15	3	1	11.76405
22	12	0	10	0	12.04158
23	12	6	0	3	1203.337
24	12	11	0	0	12.55035
25	12	15	8	0	12.78335
26	13	0	0	3	13.00316
27	13	4	2	2	13.21053
28	13	8	1	2	13.40616
29	13	11	9	3	13.59071
30	13	15	3	2	13.76482

The Use of these Tables are both after one manner, for finding by the Table what one pound will yield, you may by Multiplication know what 5 *l.* or 10 *l.* or 100 *l.* will yield.

Example. A Lease or an Annuity being worth 25 *l. per Annum*, which is to continue 20 years, what may the value thereof be in ready money? You may see by the last Table, that 1 *l.* Annuity to continue 20 years, is worth 11 *l.* 9 *s.* 4 *d.* 3 *q.*

And so 25 *l.* a year to continue the like time is worth 25 times as much.

	l.	*s.*	*d.*	*q.*
multiply therefore	11	9	4	3
by 25				25
25 times 3 *q.* is		1	6	3
25 groats is		8	4	
25 times 9 *s.*	11	5		
25 times 11 *l.* is	275			
In all	286	14	10	3

Or if you work by the Decimals, Then 1 *l.* for 20 years is worth 11,46992
which multiply by 25 — 25

5734960
2293984

286 74800

Which comes to much at one with the former, being 286 *l.* 14 *s.* 11 *d.* 2 *q.* being somewhat more exact than the other.

Or else you may reckon up the worth of any Purchase

Purchase somewhat more vulgarly thus. The Table shews the worth of one pound Annuity or yearly Rent, So that every pound in the Table stands for one years Purchase, every 10 shillings for half a years Purchase, every 5 shillings for a quarter of a years Purchase, let the thing to be sold be of any Price or yearly Value whatsoever.

Thus one pounds yearly Rent to continue 20 years, by the Table is worth 11 *l.* 9 *s.* 4 *d.* 3 *q.* that is 11 years, and almost an half years Purchase, and so a thing of 25 *l.* a year value, to continue 20 years, is worth 11 years and an half purchase almost.

	l.	*s.*
Now 11 times 25 *l.* is	275	
and half of 25 *l.* is	12	10
which makes	287	10

Thus you may sufficiently guess at the value of any purchase, which afterward you may cast up more exactly as you please, either by the Decimals, or the other way.

But note here these Tables being cast up after the Rate of 6 *per Cent.* the Annuities to be thus valued must be sure and certain, as of good free land or such like; for Leases of Houses are not worth above 8 *l.* or 10 *l.* *per Cent.* as you may see more at large in my *Purchasers Pattern*, where there are several Tables of several rates for these Purchases.

Of Rebate.

Many make no Difference between Intereſt and Rebate, and think one Table may ſerve for both; But there is ſome ſmall Difference, which proceeds from the Intereſt of the Intereſt.

Thus *6 l.* is the Intereſt of 100 *l.* for a year, but if you Rebate 6 *l.* out of 100 *l.* for a year, you wrong your ſelf, for 6 *l*, is to be rebated out of 106 *l.* and not out of 100 *l.*

So that for Intereſt you work thus,

As 100 *to* 106 : *So* 100 *l.* *to* 106 *l.*

But for Rebate you muſt ſay,

As 106 *to* 100 : *So* 100 *l.* 94 *l.* 3396

100

10000

Which is 94 *l.* 6 *s.* 9 *d.* *half-peny.* So that out of your 100 *l.* you muſt not abate 6 *l.* and ſo receive only 94 *l.* but you are to abate only 5 *l.* 13 *s.* 2 *d.* $\frac{1}{2}$, and ſo to receive 94 *l.* 6 *s.* 9 *d.* $\frac{1}{2}$.

If you would caſt up the Rebate for any other Sum you muſt work thus,

As 100 *l.* *with the Intereſt thereof for the time required, is to* 100 *l.*

So is the Debt to be paid at the ſaid time, to its worth in ready Money.

Example.

What is the Rebate of 345 *l.* for ſix Moneths time.

First,

First, Cast up the Interest of 100 *l.* for the 6 Moneths time, which is 3 *l.* then say,

As 103 l. *to* 100.		*So* 345 l.
		100
		34500

	l.	
34500	(334	95[14]
103		

Which is 334 *l.* 19 *s.* 1 *q.* and so much is to be paid for the 345 *l.* abating for the said 6 Moneths, 10 *l.* 0 *s.* 11 *d.* $\frac{1}{2}$; whereas the Interest thereof for the said time would come to 10 *l.* 7 *s.* So there will be 6 *s.* saved by this Account.

For the ready casting up this, you may help your self with this Table, which I have cast up for 12 Moneths, being very necessary for Merchants, who use this way of Rebate, whereby you may see that the Rebate for 1000 *l.* for 12 Moneths is but 56 *l.* 12 *s.* whereas the Interest of 1000 for 12 Moneths is 60 *l.* which shews there is a considerable Difference between Interest and Rebate, and that they cannot be performed by one kind of Rule or Table.

A Table of Rebate at 6 *l.* *per Cent.*

		1 *Mon.*			2 *Month.*			3 *Month.*			4 *Month.*			5 *Month.*			6 *Month.*		
		l.	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d*	*l.*	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
shill.	5									1			1			1			2
	10						1			2			2			3			3
	15						2			3			3			4			5
pounds.	1			1			2			4			5			6			7
	2			2			5			7			9		1	0		1	2
	3			3			7			11		1	2		1	6		1	9
	4			5			10		1	2		1	7		1	11		2	4
	5			6		1	0		1	6		1	11		2	5		2	11
	6			7		1	2		1	9		2	4		2	11		3	6
	7			8		1	5		2	2		2	9		3	5		4	1
	8			9		1	7		2	4		3	2		3	11		4	8
	9			11		1	9		2	8		3	6		4	5		5	3
	10		1	0		2	0		2	11		3	11		4	11		5	10
	20		2	0		3	11		5	11		7	10		9	9		11	8
	30		3	0		5	11		8	10		11	9		14	8		17	6
	40		4	0		7	11		11	10		15	8		19	6	1	3	4
	50		5	0		9	11		14	9		19	7	1	4	5	1	9	2
	60		6	0		11	11		17	9	1	3	6	1	9	3	1	14	11
	70		7	0		13	10	1	0	8	1	7	5	1	14	0	2	0	9
	80		8	0		15	10	1	3	8	1	11	4	1	19	0	2	6	7
	90		8	11		17	10	1	6	7	1	15	4	2	3	11	2	12	5
	100		9	11		15	10	1	9	7	1	19	3	2	8	9	2	18	3
	200		19	10	1	19	7	2	19	1	3	18	5	4	17	7	5	16	6
	300	1	9	11	2	19	5	4	8	8	5	17	8	7	6	4	8	14	9
	400	1	19	10	3	19	2	5	18	3	7	16	11	9	15	1	11	13	0
	500	2	9	9	4	19	0	7	7	9	9	16	1	12	3	11	14	11	3
	600	2	19	8	5	18	10	8	17	4	11	15	3	14	12	8	17	9	6
	700	3	9	8	6	18	7	10	6	11	13	14	6	17	1	6	20	7	9
	800	3	19	7	7	18	5	11	16	5	15	13	9	19	10	3	23	6	0
	900	4	9	7	8	18	2	13	6	0	17	12	11	21	19	0	26	4	3
	1000	4	19	6	9	18	0	14	15	7	19	12	2	24	7	10	29	2	6

A Table of Rebate at 6 *l. per Cent.*

	7 Month.			*8 Month.*			*9 Month.*			*10 Month.*			*11 Month.*			*12 Mon*		
	l.	*s.*	*d*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d*
Shill. 5			2			2			2			3			3			3
10			4			5			5			6			6			7
15			6			7			8			9			9			10
Pounds. 1			8			9			10			11		1	0		1	2
2		1	4		1	6		1	8		1	11		2	1		2	3
3		2	0		2	4		2	7		2	10		3	2		3	5
4		2	8		3	1		3	5		3	10		4	2		4	6
5		3	4		3	10		4	4		4	9		5	3		5	8
6		4	1		4	7		5	2		5	9		6	3		6	9
7		4	9		5	5		6	0		6	8		7	4		7	11
8		5	5		6	1		6	11		7	7		8	4		9	1
9		6	1		6	11		7	9		8	7		9	5		10	2
10		6	9		7	8		8	7		9	6		10	5		11	4
20		13	6		15	5		17	3		19	1	1	0	10	1	2	8
30	1	0	3	1	3	1	1	5	10	1	8	7	1	11	3	1	14	0
40	1	7	1	1	10	9	1	14	5	1	18	1	2	1	8	2	5	3
50	1	13	10	1	18	6	2	3	1	2	7	7	2	12	2	2	16	7
60	2	0	7	2	6	2	2	11	8	2	17	2	3	3	7	3	7	11
70	2	7	4	2	13	10	3	0	3	3	6	8	3	13	0	3	19	3
80	2	14	1	3	1	6	3	8	11	3	16	2	4	3	5	4	10	6
90	3	0	10	3	9	3	3	17	6	4	5	9	4	13	10	5	1	10
100	3	7	8	3	16	11	4	6	1	4	15	3	5	4	3	5	13	2
200	6	15	3	7	13	10	8	12	3	9	10	6	10	8	6	11	6	5
300	10	2	11	11	10	9	12	18	4	14	5	9	15	12	10	16	19	7
400	13	10	6	15	7	8	17	4	6	19	0	11	20	17	1	22	12	10
500	16	18	2	19	4	7	21	10	7	23	16	2	26	1	4	28	6	0
600	25	5	10	23	1	6	25	16	9	28	11	5	31	5	7	33	10	3
700	23	12	5	26	18	6	30	2	10	33	6	8	36	9	10	39	12	5
800	27	1	1	30	15	5	34	9	0	38	1	11	41	14	1	45	5	8
900	30	8	8	34	12	4	38	15	1	42	17	2	46	18	5	50	18	10
1000	33	16	4	38	9	3	43	1	2	47	12	5	52	2	8	56	12	1

This Table only shews the Rebate for whole Moneths, as they are commonly reckoned 12 Moneths in the year, and it extends only to a year: If you have occasion for a longer time, as 15, 18, or 20 Moneths, you must work by the Rule; also if you would know the Rebate of any time under a Moneth, for Weeks or Daies: If you will be exact you must work it by the Rule. But if your Sums of Money are not great, the Tables of Interest will serve to shew the Rebate for any time under a Moneth, there being but little Difference between them, as you may see by the Tables, that the Interest of 1000 *l.* for a Moneth is 5 *l.* and the Rebate of 1000 *l.* for a Moneth is 4 *l.* 19 *s.* 6 *d.* there being but 6 *l.* Difference.

Of Equation of Paiments.

Question, One Merchant owes to another 400 *l.* to be paid at four six Moneths, that is 100 *l.* at 6 Moneths: 100 *l.* more at 12 Moneths: 100 *l.* more at 18 Moneths: and the last 100 *l.* at 24 Moneths. Now it is agreed to pay the Money altogether. The Question is to know the exact time the Money ought to be paid, so that neither the one nor the other may lose by the Bargain?

Now to answer such Questions there are several Rules propounded by many, which though they come near, yet they do not exactly perform the business.

As first, when the Terms of the paiment are equal as in this Question, then you may resolve it

it as before in Progression, by adding one Term of time more, and taking the half thereof: so if you add one six Moneths more to these four, they make 30 Moneths, and the half thereof, which is fifteen Moneths is the time of paiment.

But if the Sums of Money to be paid, or the times of paiment be different. As suppose this 400*l.* to be paid after this manner, 100*l.* at 3 Moneths, 100*l.* at 6 Moneths, 100*l.* at 12 Moneths, and 100*l.* at 24 Moneths. What is the time of paying it all together?

First, Multiply the several Sums of Money by the times of their paiments, and add the total Sum thereof together, and divide it by the whole Debt.

Thus	100 *l.* multiplied by	3 Mon. is	300
Then		6 Mon. is	600
Then		12 Mon. is	1200
Lastly,		24 Mon. is	2400
	The Sum of all four is		4500

Which divided by 400*l.* the whole debt, shews the time of paiment to be 11 Moneths and $\frac{1}{4}$. This doth resolve the Question exactly according to the Tables of Interest. For in the first Question.

			l.	*s.*	*d.*
The Interest of 100 *l.* for	6	Mon. is	3	0	0
	12		6	0	0
	18		9	0	0
	24		12	0	0
		In all	30	0	0

And

And so likewise the Interest of 400 *l.* for 15 Moneths is just 30 0 0

And so in the second Question,

			l.	*s.*
The Interest of 100 *l.* for	3	Mon. is	1	10
	6		3	0
	12		6	0
	24		12	0
In all			22	10

So likewise the Interest of 400 *l.*

	l.	*s.*
for 11 Moneths is	22	0
for $\frac{1}{4}$ of a Moneth	0	10
Just equal to the other	22	10

But to answer this Question exactly is to reckon by the Rebate of the Money, and not by the Interest of the Money.

Thus in the first Question, The Rebate of 100 *l.*

			l.	*s.*	*d.*
for	6	Moneths is	2	18	3
	12		5	13	$2\frac{1}{2}$
	18		8	5	$1\frac{1}{2}$
	24		10	14	$3\frac{1}{2}$
In all			27	10	$10\frac{1}{2}$

But the Rebate of 400 *l.* for fifteen Moneths is 27 *l.* 18 *s.* 1 *d.* $\frac{1}{2}$

The Difference	0	7	3

So

So that the time of paiment must not be full 15 Moneths, but must lack 5 daies and an half, in which time the Interest of the 400 *l.* comes to 7 *s.* 2 *d.* $\frac{3}{4}$.

Thus though the foresaid Rules for Equation of times of paiment be not exact according to the Rules of Rebate, yet they come somewhat near it, and may be used as a good help to find out the exact time of paiment, which otherwise will be very difficult to resolve.

The End of the first Part.

THE SECOND PART OF ARITHMETICK,

Which Treateth of

Fractions or Broken Numbers.

CHAP. I.

Of Fractions or Broken Numbers, and the Difference thereof.

A Fraction or a Broken Number, is a Part or many Parts of any whole Number, and it is usually expressed by two Numbers in smaller Figures, one above the other, with a little Line drawn between them. The Figure or Figures which are above the Line, is called
3 Numerator.
4 Denominat.
the Numerator; the other underneath the Line, is called the Denominator, as by Example, 3 quarters is a Fraction, which must be set down thus, $\frac{3}{4}$ whereof 3 which is the higher Number above the Line is called the Numerator, and 4 which is

is under the Line is called the Denominator. And it is alwaies convenient that the Numerator be less in Number than the Denominator. For if the Numerator and the Denominator be equal Numbers, then shall they represent an whole Number thus, as $\frac{1}{1}$ $\frac{2}{2}$ $\frac{3}{3}$, which are whole Numbers, which appears if the Numerators of these, and all such like be divided by their Denominators, for their Quotients will alwaies be but 1. But in case that the Numerator of any Fraction do exceed his Denominator, then it is more than one whole: as $\frac{29}{18}$ is more than a whole Number by $\frac{11}{18}$ and this is called an improper Fraction. Furthermore it is to be understood, that when the Numerator is just the half of the Denominator, then the same broken Number is the just half of one whole, as $\frac{6}{12}$ $\frac{7}{14}$ $\frac{8}{16}$ $\frac{9}{18}$, and the other like, are the halfs of one whole Number whether it be of Money, or Measure, or Weight, or any other thing; And from this half of any thing, there doth grow and come forth 2 Progressions natural: the one proceeding by augmenting or increasing, as these, $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{4}{5}$ $\frac{5}{6}$ $\frac{6}{7}$ $\frac{7}{8}$ $\frac{8}{9}$ $\frac{9}{10}$. &c.

1 Note.
2 Note.
3 Note.
4 Note.

And these may proceed infinitely, and yet never reach to make a whole Number, or $\frac{1}{1}$, and the other Progression, doth proceed by diminishing or decreasing thus, $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{9}$ $\frac{1}{10}$, &c.

And these may proceed infinitely, and yet never come to make a 0 which signifieth nothing, but shall ever retain some certain value of an unity; whereby it doth appear that Fractions or broken Numbers are infinite.

CHAP.

CHAP. II.

Of the Reducing or bringing together of two Fractions, or many of divers Denominations, unto Fractions of one like Denomination.

REduction, is as much as to reduce and bring together, or to put two or many Numbers, being of divers Denominations the one from the other, into Fractions of one Denomination, in reducing them unto a common Denominator, and the reason hereof is, because the Diversity and Difference of the broken Numbers do come of the Denominators part, or of divers Denominators. Now for the understanding, and performing hereof, there is this General Rule. First, You must Multiply the several Denominators of the Fractions, the one by the other, and so you shall have a new Denominator common to all the Fractions, which Denominator you must divide by the particular Denominators of every of the said Fractions, and multiply every Quotient by his own Numerator, and so you shall have new Numerators, for the Numbers which you would reduce, as appeareth by this Example following.

Reduction into one common Denomination.

If you will reduce $\frac{2}{3}$ and $\frac{4}{5}$ together, first make a Croſs between the two Fractions, as here you ſee, and then you muſt multiply the two Denominators the one by the other, thus, ſaying 3 times 5 is 15, which muſt be a new Denominator common to them both, and muſt therefore be ſet under the Croſs at each end thereof. 1 Rule.

$$\begin{array}{ccc} 10 & & 12 \\ \frac{2}{3} & \times & \frac{4}{5} \\ 15 & & 15 \end{array}$$

Then multiply your two Fractions Croſs-wiſe, the Numerator of the one by the Denominator of the other, ſaying, 2 times 5 is 10, which you muſt ſet on the top of the Croſs, next the firſt Fraction, and then 3 times 4 is 12, which you muſt ſet on the top of the Croſs next the other Fraction, ſo theſe two Fractions $\frac{2}{3}$ and $\frac{4}{5}$ will be found to be $\frac{10}{15}$ and $\frac{12}{15}$ being reduced into one common Denomination.

If you will reduce theſe four Fractions, $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$ into one Denomination. 2 Rule.

First, you muſt multiply all the Denominators, the one by the other, that is to ſay, 2 by 3 maketh 6: then 6 by 4 amounteth to 24. Laſt of all 24 by 6, and thereof cometh 144, for the common Denominator as before.

$$\begin{array}{r} 2 \\ \underline{3} \\ 6 \\ \underline{4} \\ 24 \\ \underline{6} \\ 144 \end{array}$$

Then for the firſt Fraction, which is $\frac{1}{2}$, divide 144 by the Denominator 2, and thereof cometh 72, which multiply by the Numerator 1, and it is ſtill 72, ſet

$$\begin{array}{rr} \cancel{144} & (72 \\ \cancel{22} & \underline{1} \\ & 72 \end{array}$$

$\frac{1}{2}$ *is* $\frac{72}{144}$

ſet that over or by the $\frac{1}{2}$, and that is $\frac{72}{144}$, for the $\frac{1}{2}$.

Then divide 144 by the ſecond Denominator 3, and thereof cometh 48, which multiply by the ſecond Numerator 2, and they are 96, which ſet over the $\frac{2}{3}$, and they make $\frac{96}{144}$ for the $\frac{2}{3}$.

$$\begin{array}{rr} \cancel{1} & \\ \cancel{144} & (48 \\ \cancel{33} & 2 \\ & \overline{96} \end{array}$$

$\frac{2}{3}$ *is* $\frac{96}{144}$

Then divide 144 by the third Denominator 4 and thereof cometh 36, which multiply by the third Numerator 3, and they make 108, which ſet over the $\frac{3}{4}$, and they are $\frac{108}{144}$ for the $\frac{3}{4}$.

$$\begin{array}{rr} \cancel{2} & \\ \cancel{144} & (36 \\ \cancel{44} & 3 \\ & \overline{108} \end{array}$$

$\frac{3}{4}$ *is* $\frac{108}{144}$

Finally, Divide 144 by the laſt Denominator 6, and thereof cometh 24, which multiply by the laſt Numerator 5, and thereof cometh 120, which ſet over the $\frac{5}{6}$, and they are $\frac{120}{144}$ for the $\frac{5}{6}$. So all the four Fractions are reduced into one Denomination.

$$\begin{array}{rr} \cancel{2} & \\ \cancel{144} & (24 \\ \cancel{66} & 5 \\ & \overline{120} \end{array}$$

$\frac{5}{6}$ *is* $\frac{120}{144}$

Reduction of Fractions of Fractions.

If you will reduce a Fraction of Fractions into one Fraction, as for Example, the $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$, you muſt multiply all the Numerators, one by the other, to make one Broken Number of the 3 Broken Numbers, that is to ſay, 2 by 1 maketh 2: and then 2 by 4 maketh 8, which 8 is your Numerator. Then multiply the Denominators the one by the other, that is to ſay, 3 by 4, maketh 12, and then 12 by 5 maketh 60, for your Deno-

Denominator, set 8 over 60, with a Line between them and they be $\frac{8}{60}$, which being abbreviated, are $\frac{2}{15}$, and so much are the $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$, as appeareth in the Margin.

Another Example of the same Reduction, and of the second Reduction.

If you will reduce $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$, with the $\frac{3}{4}$ of $\frac{5}{7}$, and the $\frac{1}{2}$ of the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{3}$. First, it behoveth you of every party of the broken Numbers, to make of each of them one broken, as by the third Reduction is taught, that is to say, in multiplying the Numerators by Numerators, and Denominators by Denominators. First, for the first part which is $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$, you must as is before said, multiply 2 by 1, and then by 4, and you shall have 8 for the Numerator: likewise multiply 3 by 4, and the Product by 5, and you shall have 60 for the Denominator: so they make $\frac{8}{60}$, which being abbreviated are $\frac{2}{15}$, for the first part, that is to say, for the $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$. 4 Rule.

Secondly, for the $\frac{3}{4}$ of $\frac{5}{7}$, multiply likewise the Numerator 3 by 5, it maketh 15 for the Numerator. And multiply 4 by 7 it maketh 28 for the Denominator, and then they be $\frac{15}{28}$ for the second part: that is to say, for the $\frac{3}{4}$ of $\frac{5}{7}$.

Thirdly, for the $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{3}$, you must multiply the Numerators the one by the other, that is to say 1 by 1, and then by 2, and lastly by 1, and all maketh but 2 for the Numerator: Likewise multiply the Denominators, 2 by 2 maketh 4, and 4 by 3 maketh 12, and then 12

by 3 maketh 36 for the Denominator: So they are $\frac{2}{36}$ which being abbreviated maketh $\frac{1}{18}$ for the third part; that is to say, for $\frac{1}{2}$ of the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{2}$.

Last of all, take the $\frac{2}{15}$ the $\frac{15}{28}$ and $\frac{1}{18}$, and reduce them according to the order of the second Reduction, and you shall find $\frac{1008}{7560}$ for the $\frac{2}{15}$. and $\frac{4050}{7560}$ for the $\frac{15}{28}$, and $\frac{420}{7560}$ for the $\frac{1}{18}$, and thus are broken Numbers of broken reduced, as appeareth by Practice.

First		*Second*		*Third Part.*
$\frac{2}{3}$ $\frac{1}{4}$ $\frac{4}{5}$	‖	$\frac{3}{4}$ $\frac{5}{7}$	‖	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{2}{3}$ $\frac{1}{3}$
$\frac{8}{60}$	:	$\frac{15}{28}$	:	$\frac{2}{36}$

Which abbreviated are

$\frac{2}{15}$: $\frac{15}{28}$: $\frac{1}{18}$

Which reduced are

$\frac{1008}{7560}$: $\frac{4050}{7560}$: $\frac{420}{7560}$

Reduction of Broken Numbers, and the parts of Broken together.

5 Rule. If you will reduce $\frac{1}{3}$, and the $\frac{1}{3}$ of $\frac{1}{2}$ together, to bring them into one Broken Number, you must first set down the $\frac{1}{3}$ and $\frac{1}{2}$, as appeareth in the Margin with a Cross between them, and then multiply the two Denominators, the one by the other, that is to say, 2 by 3 maketh 6,

$$\begin{array}{ccc} & 3 & \\ \frac{1}{3} & \mathbf{X} & \frac{1}{2} \\ & 6 & \end{array}$$

set

ſet that under the Croſs, then multiply the firſt Numerator 1, by the laſt Denominator 2, and that maketh 2, unto which add the laſt Denominator 1, and they be 3, which ſet above the Croſs, ſo ſhall you find the $\frac{1}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$, do make $\frac{3}{6}$, which being abbreviated doth make $\frac{1}{2}$, which is as much as the $\frac{1}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$, being reduced into one Fraction.

Likewiſe if you will reduce the $\frac{2}{3}$ and the $\frac{1}{4}$ of $\frac{1}{3}$, you muſt do as before, ſet down the $\frac{2}{3}$ and $\frac{1}{4}$, with a Croſs between them, then multiply the Denominators the one by the other, that is to ſay, 3 by 4 maketh 12: which ſet under the Croſs, as you ſee in the Margin, and then multiply the firſt Numerator 2, by the laſt Denominator 4, and thereof cometh 8, whereunto add the laſt Numerator 1, and that maketh 9, which 9 ſet over the Croſs, ſo ſhall you find that the $\frac{2}{3}$ and the $\frac{1}{4}$ of $\frac{1}{3}$ are worth $\frac{9}{12}$, which abbreviated do make $\frac{3}{4}$ as appeareth by Example in the Margin.

9
$\frac{2}{3}$ X $\frac{1}{4}$
12

Reduction of whole Numbers and broken together into a Fraction, which Fraction is called an improper Fraction.

If you will reduce whole Numbers and broken into broken, you ſhall reduce the whole Number into broken, as by this Example may appear: if you will reduce 17 $\frac{5}{8}$ into a broken Number, firſt you muſt multiply the whole Number 6 Rule.

 Number

Number 17 by the Denominator of the broken, which is 8, in saying 8 times 17 do make 136, to which you must add the Numerator of $\frac{5}{8}$ which is 5, and all amounteth to 141, which set over 8, with a Line between them, and they will be $\frac{141}{8}$, so much is $17\frac{5}{8}$ worth in an improper Fraction, as appears here by Practice.

$$\begin{array}{lr} & 17 \\ & 8 \\ \hline & 136 \\ \textit{add} & 5 \\ \hline & 141 \end{array}$$

In case you have whole Numbers and broken to be reduced with broken, you must bring the whole Number into its broken, in multiplying it by the Denominator of the broken Number going therewith, and add thereunto the Numerator of the said broken Number, as in the last Example is declared, and then reduce that broken Number with the other broken, as here appeareth by this Example.

Reduce 10 $\frac{2}{3}$ *and* $\frac{4}{7}$ *together*, first bring 10 $\frac{2}{3}$ all into thirds, as it is taught by the last Reduction, and you shall find $\frac{32}{3}$, then reduce the $\frac{32}{3}$ and $\frac{4}{7}$ together by the first Reduction, and you shall find $\frac{224}{21}$, for the $\frac{32}{3}$; and $\frac{12}{21}$ for for $\frac{4}{7}$, as appeareth here by Practice.

$$\begin{array}{ccc} & 10\ \frac{2}{3} & \\ & 3 & \\ \hline & \frac{32}{3} & \\ 224 & & 12 \\ \frac{32}{3} & \times & \frac{4}{7} \\ 21 & & 21 \end{array}$$

Also in case you have in both parts of your Reduction, as well whole Numbers as broken, you must alwaies put the whole of each part into his broken, as by the last Reduction is taught.

Example. If you will reduce 12$\frac{1}{4}$ with 14$\frac{2}{3}$, to bring them into one Denomination, first

First, bring the $12\frac{1}{4}$ all into fourths, and you shall find $\frac{49}{4}$.

Then likewise reduce $14\frac{2}{3}$ all into thirds, and you shall have $\frac{44}{3}$ for the $14\frac{2}{3}$.

Then reduce $\frac{49}{4}$ and $\frac{44}{3}$ together by the order of the first Reduction, and you shall find $\frac{147}{12}$ for the $\frac{49}{4}$, and $\frac{176}{12}$ for the $\frac{44}{3}$: as here by Practice doth plainly appear.

$$12\tfrac{1}{4} \quad 14\tfrac{2}{3}$$

$$\frac{49}{4} \quad \frac{44}{3}$$

$$\begin{array}{ccc} 147 & & 176 \\ \frac{49}{4} & \times & \frac{44}{3} \\ 12 & & 12 \end{array}$$

CHAP. III.

Of Abbreviation of one Broken Number into a lesser Broken.

Abbreviation is as much as to set down, or to write a broken Number by some lesser Number of Figures, and yet not diminish the value thereof. Which to do there is a Rule, whose Operation is thus, divide the Numerator, and likewise the Denominator by any whole Number, the greatest you may find which will divide them both: and of the Quotient of your Numerator so divided, make your new Numerator, and likewise of that of the Denominator, make your Denominator. As for Example.

If you will abbreviate $\frac{54}{81}$, you shall understand that the greatest whole Number that you may

may take, by which you may divide both the Numerator and the Denominator, is 27, for you cannot take any other greater whole Number, which will divide both the Numerator and the Denominator, but that there will be either more or leſs than a whole Number; therefore if you divide 54 by 27, you ſhall find in the Quotient 2 for the Numerator: likewiſe if you divide 81 by 27 you ſhall have in the Quotient 3 for the Denominator: then put 2 over the 3, with a Line between them, and you ſhall find $\frac{2}{3}$, and thus by this Rule the $\frac{54}{81}$ are abbreviated unto $\frac{2}{3}$: as appeareth in the Margin, and ſo is to be underſtood of all others.

$\frac{54}{81}$

10
54 (2
27

$\frac{2}{3}$

2
81 (3
27

The Form and Manner how to find the greateſt Number, by which you may wholly divide the Numerator and Denominator (to the end you may abbreviate them) is thus.

Firſt, divide the Denominator by his Numerator, and if any Number do remain, let your Diviſor be divided by the ſame Number, and ſo you muſt continue until you have ſo often divided that there may nothing remain, then it is to be underſtood that your laſt diviſor (whereat you did end, and that 0 did remain after your laſt diviſion) is the greateſt Number, by which you muſt abbreviate: as you did in the

the last Example. But in case that your last Divisor be 1, it is a token that the said Number cannot be abbreviated to any lower Fraction than you find it at the first.

Example, Of $\frac{54}{81}$ divide 81 which is the Denominator by 54, which is his Numerator, and there resteth 27, then divide 54 by 27, and there remaineth 0, which is nothing, wherefore your last Divisor 27, is the Number by which you must abbreviate $\frac{54}{81}$: as in the last Example is specified.

Several other manners of Abbreviation.

1 Mediate the Numerator, and also the Denominator of your Fraction, in case the Numbers be even, that is to say, take alwaies the half of the Numerator, and likewise of the Denominator, and of the mediation or half of the Numerator, make your Numerator, also of half the Denominator make your Denominator, and so continue as often as you may in taking alwaies the half of the Numerator, and of the Denominator. Secondly, See if you may abbreviate the Numbers which do remain by 3, by 4, 5, 6, 7, 8, 9, or by 10: for you must abbreviate them as often as you can by any of the said Numbers. And it is to be noted that with whatsoever Number of these you do abbreviate the Numerator of your Fraction, by the same you must abbreviate likewise the Denominator, so continuing until they can no more be abbreviated. Thirdly, It is to be understood, that if

the Numerator and the Denominator be even Numbers, as you may know when the firſt Figure is an even Number, or a 0, then you may perceive if both the Numerator and the Denominator may be abbreviated by 10, by 8, by 4, or by 2: albeit that ſometimes they may be abbreviated by 3. And if they be odd Numbers, then muſt you conſider if they may be abbreviated by 9, by 7, by 5, or by 3. but when the firſt Number as well of the Numerator, as of the Denominator are even Numbers, then may you well know that ſuch Numbers may be abbreviated by 2, as is aforeſaid. Fourthly, If you add the Figures of the Numerator together in ſuch manner as you do in making the proof by 9 in whole Numbers, then if you find 9, it appeareth that you may abbreviate that Number by 9, and likewiſe by 3, and ſometimes by 6, If you find 6, it may be abbreviated by 6, and alwaies by 3, If you find 3; it is a ſign that you may abbreviate by 3. And by whatſoever Number you do abbreviate the Numerator, by the ſame you muſt abbreviate likewiſe the Denominator, Fifthly, If the firſt Figures of the ſame Numbers be 5 or 0, you may abbreviate them by 5, but if the firſt Figures be both 0, they may be abbreviated by 10, in cutting away the two Cyphers, thus, as $\frac{20}{30}$ which maketh $\frac{2}{3}$ and ſometimes by 100, thus, as, $\frac{100}{200}$ in cutting away the four Cyphers after this ſort, $\frac{1|00}{2|00}$, and then $\frac{100}{200}$ makes $\frac{1}{2}$, and after this manner have I ſet here divers Examples, And although all broken Numbers cannot be abbreviated by this Rule, yet all Fractions may

be

be well abbreviated by the first Rule aforesaid.

Examples.

$\frac{3840}{7680}$		$\frac{1890}{4795}$	
Abbreviated	*by* 10	*Abbreviated*	*by* 9
is $\frac{384}{768}$	*by* 8	*is* $\frac{210}{525}$	*by* 7
is $\frac{48}{96}$	*by* 6	*is* $\frac{30}{75}$	*by* 5
is $\frac{8}{16}$	*by* 4	*is* $\frac{6}{15}$	*by* 3
is $\frac{2}{4}$	*by* 2	*is* $\frac{2}{5}$	
is $\frac{1}{2}$			

Furthermore you shall understand that sometimes it happeneth that all the Figures of the Numerator are the same and also them of the Denominator, which when it so happeneth, you may then take one of them of the Numerator, and one of them of the Denominator, and it shall be abbreviated, as $\frac{555}{888}$ being abbreviated after this manner cometh to $\frac{5}{8}$, Also it happeneth sometimes, that two or many Figures of the Numerator are proportioned unto two or many Figures of the Denominator, and that the other Figures of the same Number are alike the one to the other, in this proportion following; Then may you take two or more Figures, as well of the Numerator as of the Denominator, and by this manner the same Number shall be abbreviated; as $\frac{4141}{5959}$ being abbreviated by this Rule do come to $\frac{41}{59}$.

4 Also

4 Also it happeneth sometimes, that you would abbreviate one Number unto the likeness of another. And to know if the same may be abbreviated, and also by what Number it may be abbreviated, you must divide the Numerator of one Number, by the Numerator of the other; and likewise the Denominator of the one by the Denominator of the other; for in case that after every division there do remain 0, and that the two Quotients be equal, then is one of them the Number by which the said Fraction must be abbreviated, as by Example of $\frac{115}{207}$, I would know if they may be abbreviated unto $\frac{5}{9}$, and to do this, you must divide 115 by 5, and you must divide 207 by 9, and there will come into both the Quotients 23: by which it appeareth that this Number may be thus abbreviated by 23.

	~~10~~	~~10~~
$\frac{115}{207}$	~~115~~ (23	~~207~~ (23
$\frac{5}{9}$	~~55~~	~~99~~

CHAP. IV.

To reduce any Fractions into Decimal Fractions, which are the plainest and best Fractions, either for understanding the true value, or for the ready Use in most Operations.

All that hath bin done hitherto in Reduction and Abbreviation of Fractions, is only for these two ends, First, the better to understand the value

value of the Fraction. Secondly, to fit them for the following works of Addition, Subtraction, Multiplication and Division, according as you have occasion. Now in both these respects, Decimal Fractions are most plain and easie.

For this supposeth every whole unite to be divided into ten parts, and therefore they are called Decimal Fractions, the Number 10 being alwaies the least Denominator. But because this small Number is not sufficient so plainly and fully to distinguish the value of all Fractions, therefore it is increased still by 10, *viz.* 100, 1000, 10000, or into as many tenth parts as you will, but still the Numerator and Denominator bear the same value and proportion one to another as if they were in lesser Numbers.

Thus $\frac{5}{10}$ $\frac{500}{1000}$ $\frac{5000}{10000}$ all signifie but one half of an unite.

And so $\frac{25}{100}$ $\frac{250}{1000}$ $\frac{2500}{10000}$ all signifie but one quarter of an unite.

Thus these Fractions having in effect but one common Denominator, which is 1 divided into 10, 100, or 10000 parts, their value is readily known, though their Denominator be not expressed, but is alwaies understood to be one place more than the Numerator doth express: And therefore this known Denominator is most times omitted, and the Numerator only expressed by small Figures parted from the whole Number by a little Quotient line thus, (5 (50, or thus |500 |5000, or by a full point, or comma thus, .5 or ,50.

Now

Now the way to reduce any Single Fraction into a Decimal, is to divide the Numerator by the Denominator, according to the common Rules of Division, adding a Cypher or two or more at the end of your Numerator, as the case requires, to make the Number a place or two more, that so the Fraction may be more exact.

Thus the two great Fractions $\frac{3840}{7680}$ and $\frac{1890}{4725}$ formerly abbreviated being thus divided by adding one Cypher to their Numerators, are found to be only 5 tenth parts that is an half; and 4 tenth parts, which are thus readily reduced and abbreviated by this Division.

$$\begin{array}{l} \cancel{3} \\ \cancel{38400} \ (\frac{5}{10} \\ \cancel{7680} \end{array} \qquad \begin{array}{l} \cancel{222} \\ \cancel{18900} \ (\frac{4}{10} \\ \cancel{4725} \end{array}$$

But if upon the Division you find any Remainer, you must still put more Cyphers to the Numerator, and so keep on your Division until you leave no Remainer, or at least until you have made your Decimal Fraction unto 3 or 4 places, which will be exact enough in most Operations.

Thus $\frac{81}{324}$ being divided as before, produceth 25 in the Quotient, that is $\frac{25}{100}$ or one quarter.

$$\begin{array}{l} \cancel{1} \\ \cancel{16} \\ \cancel{172} \\ \cancel{8100} \ (25 \\ \cancel{3244} \\ \cancel{32} \end{array}$$

And

```
            100
            011
           11888
            108000 (333
           32444
            322
             3
```

And $\frac{128}{324}$ being divided as before, produceth (333 in the Quotient that is $\frac{333}{1000}$.

And still if you go on to divide it, there is the same Quotient and Remainer, which in a perfect Fraction should be just $\frac{1}{3}$ one third. But because 100, or 1000 being an even Number cannot be divided into thirds exactly, therefore we take three or four Figures into the Decimal Fractions to make the Operation as perfect as we can; and this will come very neer, for if you multiply 333 by 3, it will make 999 which should be 1000, so it lacks but one in 1000; and if you go to a place farther, and make your Fraction 3333, this multiplied by 3 makes 9999, which wants but one in 10000.

And these Decimal Fractions are also readily produced, for having divided any Sum, and finding a Remainer left, which with the Divisor makes a Fraction, by adding two or three Cyphers more to your Sum, and continuing your Division, so you will find as it were a second Quotient which will be the Decimal Fraction thereof.

For Example, Let 1128*l*. be equally divided among a company of Soldiers, being 72, how much is each man to have for his share?

```
  44|44
 408|888       l.
1128|000 (15   |666
 722|222
  77|77
```

By

By the Operation you see every man is to have 15 *l.* and by adding 3 Cyphers and continuing the Division, you will find ⌊666, that is $\frac{2}{3}$ of a pound more, which is 13 *s.* 4 *d.*

But now as the value of these Decimal Fractions are easily known in respect of 100, or 10000; so it is necessary to know the value of these Fractions in respect of Money, Weight, Time, or Measures, which for this purpose may be collected into Tables, werking according to this Rule and Proportion by the Rule of Three.

As 20 *s.* *to* 100000	:	*So* 1 *s.*	*to*	,05000
As 20 *s.* *to* 100000	:	*So* 2 *s.*	*to*	,10000
As 240 *d.* *to* 100000	:	*So* 6 *d.*	*to*	,02500
As 960 *q.* *to* 100000	:	*So* 2 *q.*	*to*	,00208

After this order these following Tables are framed, wherein you must be careful to observe the Figures that stand towards the left hand in the place of Thousands and ten Thousands; but the Figures which stan dto the right hand you may sometimes cut off by way of Abbreviation.

A Table

A Table of Decimal Fractions for English Money; the Pound or 20 s. being divided into 100000 parts.

sh.	parts.	d.	q.	parts.	d.	q.	parts.
19	95000	11	3	04895	5	3	02395
18	90000	11	2	04791	5	2	02291
17	85000	11	1	04687	5	1	02187
16	80000	11	0	04583	5	0	02083
15	75000	10	3	04479	4	3	01979
14	70000	10	2	04375	4	2	01875
13	65000	10	1	04271	4	1	01771
12	60000	10	0	04167	4	0	01667
11	55000	9	3	04062	3	3	01562
10	50000	9	2	03958	3	2	01458
9	45000	9	1	03854	3	1	01354
8	40000	9	0	03750	3	0	01250
7	35000	8	3	03645	2	3	01145
6	30000	8	2	03541	2	2	01041
5	25000	8	1	03437	2	1	00937
4	20000	8	0	03333	2	0	00833
3	15000	7	3	03229	1	3	00729
2	10000	7	2	03125	1	2	00625
1	05000	7	1	03021	1	1	00521
		7	0	02917	1	0	00417
		6	3	02812	0	3	00312
		6	2	02708	0	2	00208
		6	1	02604	0	1	00104
		6	0	02500	0	0	00000

A Table

A Table of Reduction to bring Averdupoiz great Weight into Decimals, the 112 l. being 100000 parts.

l.	Decim.	l.	Decim.	oz.	Decim.
56	50000	14	12500	15	00837
28	25000	13	11607	14	00781
27	24107	12	10714	13	00725
26	23214	11	09821	12	00670
25	22321	10	08929	11	00614
24	21429	9	08036	10	00558
23	20536	8	07143	9	00502
22	19643	7	06250	8	00446
21	18750	6	05357	7	00391
20	17857	5	04464	6	00335
19	16964	4	03571	5	00279
18	16071	3	02679	4	00223
17	15179	2	01786	3	00167
16	14286	1	00893	2	00112
15	13393			1	00056
				½	00028

Averdupoiz little Weight, the Pound being 100000 parts.

oz.	Decim.				
15	93750	4	25000	8	03125
14	87500	3	18750	7	02734
13	81250	2	12500	6	02344
12	75000	1	06250	5	01953
11	68750	*Drams.*		4	01522
10	62500	15	05859	3	01172
9	56150	14	05469	2	00781
8	50000	13	05078	1	00391
7	43750	12	04687	q.	*Drams*
6	37500	11	04297	3	00293
5	31250	10	03906	2	00195
		9	03516	1	00098

A

A Table to Reduce Decimal Fractions into other Fractions.

1/100	1.	1/4	25.	9/19	47.3683		74.
1/50	2.	5/19	26.3157	12/25	48.	3/4	75.
1/33	3.	4/15	26.6667		49.	19/25	76.
1/25	4.	3/11	27.2727	1/2	50.	10/13	76.9230
1/20	5.	2/7	28.5714		51.	7/9	77.7777
1/16	6.25	5/17	29.4117	10/19	52.6315	11/14	78.5714
1/15	6.6667	3/10	30.	8/15	53.3333	15/19	79.9472
1/14	7.1428	4/13	30.7692	7/13	53.8465	4/5	80.
1/13	7.6923	5/16	31.25	6/11	54.5454	13/16	81.25
1/12	8.3333	6/19	31.5789	5/9	55.5555	9/11	81.8181
1/11	9.0909		32.	9/16	56.25	5/6	83.3333
1/10	10.	1/3	33.3333	4/7	57.1428	11/13	84.6253
1/9	11.1111		34.	7/12	58.3333	6/7	85.7142
2/17	11.7670	7/20	35.	10/17	58.8235	13/15	86.6667
1/8	12.5	5/14	35.7142		59.	7/8	87.50
2/15	13.3333	4/11	36.3636	3/5	60.	8/9	88.8888
1/7	14.2857	3/8	37.50	8/13	61.5392	9/10	90.
3/20	15.	5/13	38.4615	5/8	62,50	10/11	90.9091
2/13	15.3846	20/51	39.215	7/11	63.6363	11/12	91.6667
1/6	16.6667	2/5	40.	9/14	64.2857	12/13	92.3076
3/17	17.6470	5/12	41.6666	13/20	65.	13/14	92.8570
2/11	18.1818	8/19	42.1052	2/3	66.6667	14/15	93.3333
3/16	18.75	3/7	42.8570		67.	15/16	93.75
	19.	7/16	43.75	11/16	68.75	16/17	94.1136
1/5	20.	4/9	44.4444	9/13	69.2311	19/20	95.
4/19	21.0526	9/20	45.	7/10	70.	24/25	96.
3/14	21.4285	5/11	45.4545	5/7	71.43	32/33	97.
2/9	22.2222	6/13	46.1538	8/11	72.7272	49/50	98.
3/13	23.0769	7/15	46.6667	11/15	73.3333		99.
6/25	24.	8/17	47.0568	14/19	74.6841		100.

To Reduce Decimal Fractions into other Fractions.

It may alſo be ſometimes neceſſary to reduce one kind of Fractions into another, and that upon ſeveral accounts, both for the better underſtanding of the value, and for the facilitating of the Operation, as alſo for the Exactneſs of your Work. For ſome Fractions cannot be exactly expreſſed by Decimals as $\frac{1}{3}$ $\frac{2}{3}$ $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{9}$ and ſuch odd Fractions, though they are but ſmall Fractions, yet cannot well be expreſſed in Decimals without many Figures, as thus, $\frac{1}{3}$ is *33, 3333* and ſo you may proceed infinitely, yet not find a third ſo exactly, as may be required in ſome Operations. And ſo alſo moſt other Decimal Fractions do not expreſs the Fraction exactly, but taking in 3 or 4 Figures more, the Difference becomes inſenſible in moſt common Operations. But yet it is not good to cumber your Work with too many needleſs Figures, and therefore I have not exceeded 4 Figures in this Table, and you may uſe only 2 or 3 of them, and where you break off, if the Figure following be more than 5, add 1 to the former Figure, if leſs than 5, you need not regard it: thus for $\frac{1}{3}$ take 33, or 333, and for a $\frac{2}{3}$ take *66*, or *666*, or rather *67*, or *667*, adding 1 to the laſt Figure *6*. Alſo concerning the value, ſome are more eaſily underſtood one way, ſome another: this Table therefore ſets out the value of moſt Decimal Fractions under 100, as 50 is $\frac{1}{2}$, 25 is $\frac{1}{4}$, 125 is $\frac{1}{8}$, and ſo every Number from 1 to 100 is expreſſed as neer as may be, in its true value in other Fractions.

Thus

Thus being acquainted with both ſorts of Fractions, you may ſometimes uſe one way, ſometimes another way, to your beſt advantage, and in caſe of doubt, may make proof of your Work, trying the one way by the other.

CHAP. V.

Of Adding of two or many Fractions together.

IN theſe following Rules of Addition, Subtraction, and Multiplication of Fractions, I have exemplified them by Fractions, and alſo by Decimal Numbers, which in moſt Operations are far more eaſie, being to be wrought after the ſame manner as whole Numbers, whereas Fractions require ſeveral ſorts of works much different from whole Numbers; and yet each way hath its uſe: for ſome Queſtions may beſt be done by Fractions, and ſome by Decimal Numbers: Therefore when you know both, you may uſe that which is beſt and moſt ready.

To add Fractions or broken Numbers together, there is a general Rule, which is thus: If the Numbers be of unlike Denominations, you muſt reduce them into one common Denomination by the doctrine of the firſt Reduction: and when you have reduced them, you muſt then add both the Numerators together, and

ſet the Product of the ſaid Addition over the Croſs, and divide the ſame Numerator by the common Denominator, as in this Example following.

1 If you will add $\frac{2}{3}$ with $\frac{3}{4}$, you muſt firſt reduce the two Fractions both into one Denomination, according to the order of the firſt Reduction, that is, by multiplying the Denominator of the firſt Fraction, which is three, by the Denominator of the other Fraction, which is 4, and they make 12 for your common Denominator: which 12 you ſhall ſet under the Croſs, then multiply the firſt Numerator 2 by the laſt Denominator 4, and thereof cometh 8, which ſet over the $\frac{2}{3}$, and then multiply the laſt Numerator 3, by the firſt Denominator 3, and thereof cometh 9, which you muſt ſet over the $\frac{3}{4}$; then having thus reduced them, to add them together, add the Numerator 8 with the Numerator 9, and they make 17, which ſet over the Croſs, and then your Fraction will be $\frac{17}{12}$: which is the Addition of the $\frac{2}{3}$ with $\frac{3}{4}$: And becauſe the Numerator 17 is greater than his Denominator 12, therefore you muſt divide 17 by 12, and thereof will come 1, and 5 remaining, which 5 you muſt ſet apart, and 12 under the ſame with a Line between them, and they are worth $1\frac{5}{12}$, and ſo much are the $\frac{2}{3}$ added with $\frac{3}{4}$ as doth appear.

$$\begin{array}{ccccc} & 17 & & & 5 \\ 8 & & 9 & & \cancel{17}\,(1\tfrac{5}{12} \\ \frac{2}{3} & \text{X} & \frac{3}{4} & & \cancel{12} \\ 12 & & 12 & & \\ & 12 & & & \end{array}$$

To perform this in Decimals, $\frac{2}{3}$ is 0,667
$\frac{3}{4}$ is 0,750

1,417

Which added together according to common Addition is 1,417, that is one Integer and $\frac{417}{1000}$ parts.

Addition in Broken Numbers.

2 Also if you will add $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{4}{5}$ together, you must first add the $\frac{1}{2}$ and $\frac{2}{3}$ together, according to the Doctrine of the last Rule, and you shall find $\frac{7}{6}$. 5 Rule.

7
3 4
$\frac{1}{2}$ X $\frac{2}{3}$
6

Then add $\frac{3}{4}$ and $\frac{4}{5}$ together by the said last Rule, and they make $\frac{31}{20}$.

31
15 16
$\frac{3}{4}$ X $\frac{4}{5}$
20

Then finally add the $\frac{7}{6}$ (which came of the $\frac{1}{2}$ and $\frac{2}{3}$ (added together) with $\frac{31}{20}$ (which came of the $\frac{3}{4}$ and $\frac{4}{5}$ added together) and you shall find by the aforesaid Addition, that they amount to $\frac{326}{120}$.

326
140 186
$\frac{7}{6}$ X $\frac{31}{20}$
120

Wherefore divide 326 by 120, and thereof cometh 2, and 86 remaineth, which is $\frac{86}{120}$ of one whole, and they being abbreviated do make $\frac{43}{60}$, and thus the $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ and $\frac{4}{5}$ being added together do amount to 2 and $\frac{43}{60}$, as appeareth in the Margin.

8
326 (2 $\frac{43}{60}$
120

In Decimals $\frac{1}{2}$ *is* 50
$\frac{2}{3}$ *is* 67
$\frac{3}{4}$ *is* 75
$\frac{4}{5}$ *is* 80

Added 2,72
That is 2 Integers and $\frac{72}{100}$ parts.

Addition of broken Numbers of broken.

3 Rule. 3 Furthermore, if you will add the broken Numbers of broken together, as to add the $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ with the $\frac{5}{6}$ of $\frac{1}{2}$ of $\frac{5}{8}$, first you must reduce the Numbers according to the order of the fourth Reduction, by multiplying the Numerators of the first three Fractions, the one by the other, and of the Product make your Numerator; and likewise, you must multiply the Denominators of the foresaid three Fractions, the one by the other, and of the Product make your Denominator, and you shall find $\frac{24}{60}$ for the first three broken Numbers, which being abbreviated do make $\frac{2}{5}$; then reduce the other three Fractions by the said fourth Reduction, by multiplying the Numerators by Numerators, and the Denominators by the Denominators, as you did by the first three broken Numbers aforesaid, and you shall find $\frac{25}{90}$; then must you add the $\frac{2}{5}$ which came of the first three broken Numbers, and $\frac{25}{90}$, which are come of the last three Fractions, both together, by the instruction of the first Addition: and you shall find $\frac{317}{480}$; which cannot be abbreviated but is the

the juſt Product of the Addition; ſo much are $\frac{2}{3}$ of $\frac{1}{4}$ of $\frac{4}{5}$ added with the $\frac{5}{6}$ of $\frac{1}{2}$ of $\frac{5}{8}$, as hereafter by Practice doth evidently appear.

$$\frac{24}{\frac{2}{3}\ \frac{1}{4}\ \frac{4}{5}} \qquad \frac{25}{\frac{5}{6}\ \frac{1}{2}\ \frac{5}{8}}$$

$$60 \quad \frac{2}{5} \quad 96$$

$$\begin{array}{ccc} & 317 & \\ 192 & & 125 \\ \frac{2}{5} & \times & \frac{25}{96} \\ & 480 & \end{array}$$

In Decimals

$\frac{4}{5}$ is 80, the $\frac{1}{4}$ thereof 60, $\frac{2}{3}$ thereof 40,00
$\frac{5}{8}$ is 625, the $\frac{1}{2}$ 3125, $\frac{5}{6}$ thereof 26,04

Which added make 6604

Addition of broken Numbers and parts of broken, with broken and the parts of broken together.

4 Likewiſe if you will add the $\frac{2}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$ with the $\frac{4}{5}$ and $\frac{1}{4}$ of $\frac{1}{5}$, you muſt reduce the $\frac{2}{3}$ and $\frac{1}{2}$ of $\frac{1}{3}$ firſt into one Fraction, by the doctrine of the fift Reduction, and thereof cometh $\frac{5}{6}$ for the $\frac{2}{3}$ and $\frac{1}{2}$ of the ſaid thirds: then reduce the $\frac{4}{5}$ and $\frac{1}{4}$ of $\frac{1}{5}$ by the ſaid fift Reduction, and thereof cometh $\frac{17}{20}$. 6 Rule.

$$\begin{array}{ccc} & 5 & \\ \frac{2}{3} & \times & \frac{1}{2} \\ & 6 & \end{array} \qquad \begin{array}{ccc} & 17 & \\ \frac{4}{5} & \times & \frac{1}{4} \\ & 20 & \end{array}$$

Laſt of all, add the $\frac{5}{6}$ and $\frac{17}{20}$ together according to the firſt Rule of Addition: and you ſhall find $\frac{201}{120}$, which being divided bringeth 1, and $\frac{82}{120}$ parts remaining, which

$$\begin{array}{ccc} & 202 & \\ 100 & & 102 \\ \frac{5}{6} & \times & \frac{17}{20} \\ & 120 & \end{array}$$

which abbreviated maketh $\frac{41}{60}$: and thus you do perceive that the $\frac{2}{3}$ and $\frac{1}{2}$ of $\frac{1}{3}$, added with the $\frac{4}{5}$ and $\frac{1}{4}$ of $\frac{1}{5}$, do amount unto $1\frac{41}{60}$ as in the Margin doth plainly appear.

102
202 (1 $\frac{82}{120}$
120
$\frac{41}{60}$

In Decimals $\frac{2}{3}$	is 667		$\frac{4}{5}$		is 800
$\frac{1}{2}$ of $\frac{1}{3}$	is 166		$\frac{1}{4}$ of $\frac{1}{5}$		050
	——	850			——
	833	833			850
		——			
		1,684			

Addition of whole Numbers and broken, with whole Numbers and broken.

6 Rule. 5 Also if you will add $12\frac{4}{5}$ with $20\frac{5}{6}$ you may add 12 and 20 together, and they make 32, which you shall set apart.

12
20
——
32

Then add the two broken Numbers together, that is to say, $\frac{4}{5}$ and $\frac{5}{6}$ by the order of the first Addition, and they make $\frac{49}{30}$.

49
24 25
$\frac{4}{5}$ X $\frac{5}{6}$
30

Therefore divide 49 by 30, and thereof cometh 1, and $\frac{19}{30}$ parts remain, which 1 you must add unto the 32, which were put apart, and the whole Addition will be $33\frac{19}{30}$.

1
49 (1 $\frac{19}{30}$
30 32
——
$33\frac{19}{30}$

Or otherwise, you may reduce $12\frac{4}{5}$ into the likeness of a Fraction, by the order of the sixth Reduction, and they will be $\frac{64}{5}$.

$12\frac{4}{5}$
or
$\frac{64}{5}$

And

And likewise by the same Reduction, reduce 20 $\frac{5}{6}$ and they be $\frac{125}{6}$.

$20\frac{5}{6}$
or
$\frac{125}{6}$

• Then add $\frac{64}{5}$ with the $\frac{125}{6}$ by the first Addition, and you shall find $\frac{1009}{30}$.

1009
384 625
$\frac{64}{5}$ X $\frac{125}{6}$
30

Therefore divide 1009 by 30, and thereof cometh 33 $\frac{19}{30}$ as before, as by practice of the same both waies doth in the Margin appear.

$\cancel{1}1$
$\cancel{1}\cancel{0}\cancel{0}9(33\frac{19}{30}$
$\cancel{3}\cancel{3}0$

In Decimals,	12 $\frac{4}{5}$	is	12, 800
	20 $\frac{5}{6}$	is	20, 833
	added make		33, 633

CHAP. VI.

Of Subtraction in Broken Numbers.

1 IF you will subtract $\frac{2}{3}$ from $\frac{3}{4}$, you must first reduce both the Fractions into a common Denomination, by the doctrine of the first Reduction, and you shall find $\frac{8}{12}$ for the $\frac{2}{3}$ and $\frac{9}{12}$ for the $\frac{3}{4}$; therefore abate the Numerator 8 from the Numerator 9, and there will remain 1, which 1 you must set over the Cross, and the same is $\frac{1}{12}$, and so much is the rest of

of that Subtraction, as may appear here by Practice.

1	*In Decimals.*		
8 9	$\frac{3}{4}$	is	750
$\frac{2}{3}$ X $\frac{3}{4}$	$\frac{2}{3}$	is	667 *fere.*
12	*Which subtr. rests*		083

2. But if you have a broken Number to be subtracted from a whole Number, you must borrow one unit of the whole Number, and resolve it into a Fraction of like Denomination, with that Fraction, which you would abate from the same whole Number, and then abate the said Fraction therefrom, and you shall find what doth remain, as by this example.

If you abate $\frac{4}{5}$ from 8, you must borrow one of the said 8, and resolve it into fifths, like unto the Fraction, because it is $\frac{4}{5}$, and that 1 will be 5 fifths thus $7\frac{5}{5}$, therefore abate $\frac{4}{5}$ from $\frac{5}{5}$, and there will remain $\frac{1}{5}$ and subtract the 1 which you borrowed from 8, and there doth remain 7, and the $\frac{1}{5}$ also which remained after the said $\frac{4}{5}$ were abated. Thus the $\frac{4}{5}$ being subtracted from 8, doth leave $7\frac{1}{5}$ as by practice doth plainly appear.

$$\begin{array}{r} 7\frac{5}{5} \\ 0\frac{4}{5} \\ \hline 7\frac{1}{5} \end{array}$$

Or otherwise you shall put 1 under 8, with a Line between them, and that will be $\frac{8}{1}$, then set down the $\frac{4}{5}$ and the $\frac{8}{1}$ with a Cross between them, then must you reduce them into one Denomination by the first Reduction,

	36
4	40
$\frac{4}{5}$ X $\frac{8}{1}$	
5	

Reduction, and you shall find 4 over the $\frac{4}{5}$, and 40 over the $\frac{8}{1}$, then subtract the sai 4 from 40, and there will remain 36, which you shall set over the Cross, and they make $\frac{36}{5}$. Likewise you must multiply the Denominator 5 by 1 maketh 5, set that under the Cross, then divide 36 by 5, and thereof will come $7\frac{1}{5}$ as before, for the rest of that Subtraction, as here by Practice appeareth.

$$\begin{array}{l} 1 \\ 36\ (7\tfrac{1}{5} \\ 5 \end{array}$$

In Decimals,	8 Integers is	8, 000
	$\frac{4}{5}$ Subtr.	0, 80
	Rests	7, 20

3. If you will subtract broken Numbers from whole Numbers and broken: as if you would subtract $\frac{3}{4}$ from $6\frac{5}{6}$, you may by the first Subtraction abate $\frac{3}{4}$ from $\frac{5}{6}$, and there will remain $\frac{2}{24}$ or $\frac{1}{12}$, and the 6 doth still remain whole, because the $\frac{3}{4}$ may well be abated from the $\frac{5}{6}$, and thus $\frac{3}{4}$ being abated from $6\frac{5}{6}$ leaveth $6\frac{1}{12}$; as appeareth by practice.

$$\begin{array}{ccc} & 2 & \\ 18 & & 20 \\ \frac{3}{4} & \times & \frac{5}{6} \\ & 24 & \\ & \frac{1}{12} & \end{array}$$

Likewise if you will abate $\frac{2}{3}$ from $14\frac{2}{5}$, reduce all into fifths, by the sixth Reduction, and they be $\frac{72}{5}$.

$$\begin{array}{c} 14\frac{2}{5} \\ \hline \frac{72}{5} \end{array}$$

Then reduce $\frac{2}{3}$ and $\frac{72}{5}$ into one common Denomination, by the first Reduction, and you shall find $\frac{10}{15}$ for the $\frac{2}{3}$ and $\frac{216}{15}$ for the $\frac{72}{5}$: then subtract the Numerator 10 of the first Fraction, from

$$\begin{array}{ccc} & 206 & \\ 10 & & 216 \\ \frac{2}{3} & \times & \frac{72}{5} \\ & 15 & \end{array}$$

from the Numerator 216 of the second Fraction, and there remaineth $\frac{206}{15}$.

Therefore divide 206 by 15, and thereof cometh 13 $\frac{11}{15}$, and so much remains of this Subtraction, as may appear in this Example.

1
51
~~206~~ (13 $\frac{11}{15}$
~~15~~5
1

In Decimals, 14 $\frac{2}{5}$ is 14, 400
$\frac{2}{3}$ to be subtr. is 0, 667

Rests 13, 733

4 Rule. 4. If you will subtract whole Numbers and broken from whole and broken, as thus, if you will subtract 9 $\frac{1}{4}$ from 20 $\frac{1}{2}$ you must reduce 9 $\frac{1}{4}$ into fourths, and likewise the 20 $\frac{1}{2}$ into halfs, by the sixth Reduction: and you shall find $\frac{37}{4}$ for the 9 $\frac{1}{4}$; and $\frac{41}{2}$ for the 20 $\frac{1}{2}$.

9 $\frac{1}{4}$	20 $\frac{1}{2}$
$\frac{37}{4}$	$\frac{41}{2}$

Then reduce $\frac{37}{4}$ and $\frac{41}{2}$ into one Denomination, according to the first Reduction, and you shall find $\frac{74}{8}$ for the $\frac{37}{4}$ and $\frac{164}{8}$ for the $\frac{41}{2}$, then abate the Numerator of $\frac{74}{8}$ which is 74, from 164 which is the Numerator of $\frac{164}{8}$ and there remaineth $\frac{90}{8}$.

90
74 164
$\frac{37}{4}$ X $\frac{41}{2}$
8

Then divide 90 by 8, and thereof cometh 11 $\frac{1}{4}$ which is the remainer of this Subtraction.

~~1~~2
~~90~~ (11 $\frac{1}{4}$
88

In Decimals, 20 $\frac{1}{2}$ is 20, 50
9 $\frac{1}{4}$ to be subtr. is 9, 25

Rests 11, 25

Subtraction of broken Numbers of broken from Fractions of Fractions.

5. If you will subtract the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{5}$ from the $\frac{5}{6}$ of $\frac{3}{4}$ of $\frac{7}{8}$ you must first bring the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{5}$ into one Fraction by the third Reduction: and the $\frac{5}{6}$ of $\frac{3}{4}$ of $\frac{7}{8}$ likewise into one Fraction by the same Reduction, and you shall find $\frac{6}{30}$ for the first three broken Numbers, which being abbreviated do make $\frac{1}{5}$; and for the other three broken Numbers you shall find $\frac{105}{192}$; which being likewise abbreviated make $\frac{35}{64}$. 5 Rule.

Then you shall subtract $\frac{1}{5}$ from $\frac{35}{64}$ by the instruction of the first Subtraction in reducing both the Fractions into a common Denomination, as before is done, and you shall find remaining $\frac{111}{320}$, as may appear by Example.

6

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{5}$

30 $\frac{1}{5}$

105

$\frac{5}{6}$ $\frac{3}{4}$ $\frac{7}{8}$

192 $\frac{35}{64}$

111

64 175

$\frac{1}{5}$ X $\frac{35}{64}$

320

In Decimals, $\frac{7}{8}$ is ,875
$\frac{3}{4}$ thereof ,656
$\frac{5}{6}$ thereof ,547 ,547

$\frac{3}{5}$ is ,600
$\frac{2}{3}$ thereof ,400
$\frac{1}{2}$ thereof ,200 to be subt. ,200

So there rests ,347

CHAP.

CHAP. VII.

Of Multiplication in broken Numbers.

FIrst, for to multiply in broken Numbers, the general Rule is thus, you must multiply the Numerator of one Fraction by the Numerator of the other, and likewise you must multiply the Denominator of the one by the Denominator of the other: and then divide the Fraction if it may be divided, or else abbreviate it if it may be abbreviated, and it is done. But if there be whole Numbers and broken together, you must reduce the whole Numbers into their broken, and add thereunto the Numerator of his broken, and then multiply as is beforesaid, as also hereafter by Examples shall more plainly appear.

1. If you will multiply $\frac{2}{3}$ by $\frac{3}{4}$, you must multiply the Numerator 2 by the Numerator 3, and thereof cometh 6 for the Numerator. Likewise you must multiply the Denominators the one by the other, that is to say, 3 by 4, and thereof cometh 12 for the Denominator: so that this Multiplication cometh to $\frac{6}{12}$, which being abbreviated do

$$\begin{array}{ccc} & 6 & \\ \hline \frac{2}{3} & & \frac{3}{4} \\ \hline & 12 & \end{array}$$

make

make $\frac{1}{2}$: and so much amounteth the Multiplication of the $\frac{2}{3}$ by $\frac{3}{4}$: as by Practice appeareth.

By Decimals,	$\frac{2}{3}$ of 1000 is neerest	667
	$\frac{3}{4}$ of 1000 is	750
		33350
		4669
Which multiplied by the common Rules of Multiplication makes		,500|250

Which 500, 250 cutting off the three last Figures as of little or no Signification is $\frac{500}{1000}$, which is the half of 1000.

Note here, If your Decimal Fractions consist of four Figures, then you must cut off four Figures; if your Decimal Fraction consist of but two Figures, you must cut off but two Figures, and so two will remain for the Fraction. And so do generally for more or less Number of Figures.

But in this Multiplication of Fractions, it may seem strange that the Product should be less than either of the other Numbers; for it is plain that an half of any thing is less than two thirds, or three quarters thereof: whereas Multiplication in whole Numbers makes the Product much greater.

You must therefore understand, that though whole Numbers increase by Multiplication, yet 1 multiplied by 1, makes but 1 still, and doth neither increase nor diminish it: and as it makes more, being multiplied by any Number more than 1, so it makes less being multiplied by any Number which is less than one (as all Fractions are)

are) so that being multiplied by an half, it makes but $\frac{1}{2}$, and being multiplied by $\frac{1}{4}$ it makes but $\frac{1}{4}$.

And so if a Fraction be multiplied by a Fraction, both Numbers being less than one, make the Product so much the less, as they are in proportion to 1, thus $\frac{1}{2}$ multiplied by $\frac{1}{2}$ makes but $\frac{1}{4}$, and $\frac{1}{4}$ multiplied by $\frac{1}{4}$ makes but $\frac{1}{16}$; as you may conceive by this Example.

Suppose a Square to consist of ten parts every way, this 10 multiplied by 10 the whole side makes up the whole Square to be 100, which is the Integer or whole Number, but if you multiply 10 by 5, which is but half thereof, it makes but 50, which is but half of the 100; and if you multiply 5 which is $\frac{1}{2}$ of 10, by 5, it makes but 25, which is but $\frac{1}{4}$ of 100, and so it is for any other part or Fraction proportionably.

2 Rule. 2. Likewise if you will multiply a broken Number by whole Numbers, or whole Numbers by broken, which is all one, as $\frac{4}{5}$ by 18, or else 18 by $\frac{4}{5}$, you must set 1 under 18 thus, $\frac{18}{1}$, and then multiply the Numerator 18 by the Numerator 4, and thereof cometh 72.

$$\begin{array}{cc} \multicolumn{2}{c}{72} \\ \hline \frac{4}{5} & \frac{18}{1} \\ \hline \multicolumn{2}{c}{5} \end{array}$$

Likewise multiply the Denominator 5, by the Denominator 1, and thereof cometh 5, then divide 72 by the Denominator 5, and thereof cometh $14\frac{2}{5}$ for the whole Multiplication.

22
72 (14 $\frac{2}{5}$
55

Or

Or otherwise, abate from 18 his $\frac{1}{5}$ part which is $3\frac{3}{5}$ and there remaineth $14\frac{2}{5}$, as in the Margin.

18 (3 $\frac{3}{5}$			18
5		*subtr.*	3 $\frac{3}{5}$
		rests	14 $\frac{2}{5}$

By Decimals,

The Multiplicand is 18 Integers	18,000
The Multiplier $\frac{4}{5}$ of 1000 which is	800
Cut off the three last Figures	14,400|000

You have 14 Integers, and 400 parts, which is $\frac{2}{5}$.

3. Also if you will multiply a whole Number by whole Numbers and broken, or else whole Numbers and broken by a whole Number, which is all one, as by Example;

If you will multiply 15 by $16\frac{3}{4}$, or else $16\frac{3}{4}$ by 15; First reduce $16\frac{3}{4}$ all into fourths, multiplying 16 by the Denominator of $\frac{3}{4}$ which is 4, and thereof cometh 64; whereunto add the Numerator 3, and it maketh $\frac{67}{4}$, which multiply by $\frac{15}{1}$, according to the instruction of the last Example, and you shall find the Product of this Multiplication to be $\frac{1005}{4}$, which divided by 4 yields $251\frac{1}{4}$, as appears by the Work.

	16 $\frac{3}{4}$
	4
	$\frac{67}{4}$
	1005
$\frac{67}{4}$	$\frac{15}{1}$
	4
1	
1005 (251 $\frac{1}{4}$	
444	

In Decimals,	$16\frac{3}{4}$ is	16,750
	multiplied by	15
		83750
		16750
Makes 251 Integers and 250 parts, which is $\frac{1}{4}$.		251,250

4. And if you will multiply a broken Number by whole Numbers and broken, or else whole Numbers and broken by a broken: As by Example,

If you will multiply $\frac{1}{4}$ by $18\frac{2}{3}$, or else $18\frac{2}{3}$ by $\frac{1}{4}$, which is all one, you must reduce the whole Number into his broken by the sixth Reduction, and you shall find $\frac{56}{3}$, which you shall multiply by the $\frac{1}{4}$ after the Doctrine of the first Multiplication, that is to say, in multiplying the Numerator 56 by the Numerator of $\frac{1}{4}$, which is 1, and it is still 56, because 1 doth neither multiply nor divide: and likewise you must multiply the Denominator 3 by the Denominator 4, and it maketh 12: then divide 56 by 12, and thereof cometh $4\frac{2}{3}$. And so much amounteth the Multiplication of the said $18\frac{2}{3}$ multiplied by $\frac{1}{4}$, as by Example.

$18\frac{2}{3}$
3
$\frac{56}{3}$
56
$\frac{56}{3}$ $\frac{1}{4}$
12
~~$\frac{8}{56}$~~ ($4\frac{2}{3}$
~~12~~

By Decimals,

The Multiplicand 18 $\frac{2}{3}$ is	18,667
The Multiplier $\frac{1}{4}$	,250
Cut off the three first Figures, as needless, the rest shew 4 Integers and 666 parts of 1000, that is $\frac{2}{3}$.	933350 37334 4,666|750

5. If you will multiply whole Numbers and broken with whole and broken, you must first put either whole Numbers into his broken, according to the instruction of the sixth Reduction, and then multiply the one Numerator by the other, and of the Product make your Numerator: and multiply the Denominators the one by the other, and thereof make the Denominator, then divide the Numerator by the Denominator, and the Quotient shall be the increase of the Multiplication.

Example. If you would multiply 12 $\frac{4}{5}$ by 6 $\frac{3}{4}$: First, by the sixth Reduction the 12 $\frac{4}{5}$ will make $\frac{64}{5}$, and the 6 $\frac{3}{4}$ will make $\frac{27}{4}$; then multiply the Numerator 64 by the Numerator 27, and thereof cometh 1728 for the Numerator. And then you must multiply the Denominator 5 by the Denominator 4, and they do make 20.

12 $\frac{4}{5}$	6 $\frac{3}{4}$
$\frac{64}{5}$	$\frac{27}{4}$
1728	
$\frac{64}{5}$	$\frac{27}{4}$
20	

Then divide 1728 by 20, and thereof cometh 86 $\frac{2}{5}$ for the whole Multiplication.

1
1728 (86 $\frac{2}{5}$
220

By Decimals,

$12\frac{4}{5}$ is	12, 800
$6\frac{1}{4}$ the Multiplier is	6, 750
	640 000
	8960 0
	76800
Cut off the three last Figures and it makes	86,400|000

that is 86 Integers, and 400 parts.

6. If you will multiply one broken Number by many broken Numbers thus; as to multiply $\frac{2}{3}$ by $\frac{5}{7}$ and by $\frac{4}{9}$ you must multiply the Numerators of all the Fractions the one by the other, and of the Product make the Numerator, that is to say, 2 by 5, and they be 10, then 10 by 4, and they be 40 for the Numerator. Likewise you must multiply the Denominators, the one by the other, that is to say, 3 by 7 maketh 21, then 21 by 9 maketh 189 for the Denominator, then set 40 over the 189 with a Line between them, and they make $\frac{40}{189}$. And so much amounteth the whole Multiplication of the $\frac{2}{3}$ multiplied by $\frac{5}{7}$ and $\frac{4}{9}$, as by Example in the Margin. And thus is to be understood of all such like.

40		
$\frac{2}{3}$	$\frac{5}{7}$	$\frac{4}{9}$
189		

In Decimals,

$\frac{2}{3}$ of 1000 is	667
$\frac{5}{7}$ of 1000 is the first Multiplier	714
	2668
	667
	4669
Cut off the three first Figures, and	,476|238
multiply the rest by $\frac{4}{9}$ which is	,444
	1904
	1904
	1904
So it makes	,211|344

Equal to $\frac{40}{189}$, which is somewhat more than the fifth part of an Integer. Thus Fractions being multiplied decrease, whereas Integers increase, as I demonstrated before.

CHAP. VIII.

Of Division in Broken Numbers.

NOte that in Division in broken Numbers, you must set your Divisor down first, next unto the left hand, and the Dividend or Number which is to be divided alwaies toward the right hand, and then multiply Cross-

 wise

wise, that is to say, the Numerator of your Divisor by the Denominator of the Dividend, and the Product shall be the Denominator, which afterwards shall be your Divisor, and likewise you must multiply the Denominator of your first Number, that is to say, of your first Divisor by the Numerator of the Dividend, which afterwards shall be the Dividend, and that must be set over the Cross, and the Denominator under the Cross, then divide the Numerator by the Denominator, if it may be divided; if not, you must abbreviate them, as hereafter by Examples shall more plainly appear.

1. If you will divide $\frac{3}{4}$ by $\frac{2}{3}$, you must set the Divisor (which is $\frac{2}{3}$) next to the left hand, and the Dividend $\frac{3}{4}$ towards your right hand, with a Cross between them: as may appear by this Example in the Margin. Then you shall multiply the Numerator of the $\frac{2}{3}$, which is 2 by the Denominator of the $\frac{3}{4}$ which is 4, and thereof cometh 8, which shall be your new Divisor: set that 8 under the Cross, as the Denominator: then multiply the Numerator of the Dividend, that is to say, of the $\frac{3}{4}$ which is 3 by the Denominator of the Divisor, that is to wit, of the $\frac{2}{3}$ which is 3 and thereof cometh 9, set the 9 over the Cross of the Numerator, which shall be now the Dividend or Number to be divided. Then finally you shall divide 9 by 8, and thereof cometh into the Quotient $1\frac{1}{8}$, and so oftentimes is $\frac{2}{3}$ contained

$$\begin{array}{ccc} & 9 & \\ \frac{2}{3} & \times & \frac{3}{4} \\ & 8 & \end{array}$$

in

in $\frac{1}{4}$; as appeareth before in the Margin. But in case you would divide $\frac{2}{3}$ by $\frac{3}{4}$, you must likewise set your Divisor $\frac{3}{4}$ next to your left hand, as is before said. And then proceed as is above declared, and you shall find that $\frac{2}{3}$ divided by $\frac{3}{4}$ bringeth into the Quotient $\frac{8}{9}$, which cannot be divided nor abbreviated. Wherefore it appeareth that $\frac{2}{3}$ being divided by $\frac{3}{4}$ bringeth but $\frac{8}{9}$ of one unit into the Quotient.

$$\begin{array}{ccc} & 8 & \\ \frac{2}{3} & \times & \frac{3}{4} \\ & 9 & \end{array}$$

In Decimals,

	4		
	170		
	848		
The Dividend $\frac{3}{4}$ is 750	750	000	(1,125
The Divisor $\frac{2}{3}$ is 667	666	666	
	66	66	
	6	6	

Work by common Division, so the Quotient will shew you 1, and 84 remaining, then put three Cyphers to the end of your Divisor, and work again, so you shall find in your Quotient, 1,125; so your Divisor is contained in your Quotient, once, and $\frac{1}{8}$ part of 1000.

But if you will divide 667 by 750.

The Dividend being $\frac{2}{3}$ or 667. 667|000(0,888
The Divisor being $\frac{3}{4}$ or 750. 750

Here you cannot take the Divisor once out of the Dividend, therefore set 0 in the Quotient,

ent, and then divide, and you ſhall find your Quotient yield 0,888 parts of 1000, that is equal to $\frac{8}{9}$ parts, as before.

2. Likewiſe if you will divide a broken Number by a whole Number, or elſe a whole Number by a broken, as to divide $\frac{3}{4}$ by 13 you ſhall put 1 under 13, and it will be $\frac{13}{1}$ for your Diviſor, ſet that towards your left hand, and your Dividend $\frac{3}{4}$ on the right, and then multiply 13 by 4, according to the firſt Diviſion, and thereof will come 52 for the Denominator, ſet that under the Croſs, and multiply 3 by one, maketh 3 for the Numerator, ſet that over the Croſs, and it is $\frac{3}{52}$: as appeareth above.

$$\begin{array}{ccc} & 3 & \\ \frac{13}{1} & \times & \frac{3}{4} \\ & 52 & \end{array}$$

By Decimals,

In theſe kind of mixed Numbers you muſt take ſome care to ſet the whole Numbers in their place, and the Fractions in theirs, filling up the places with Cyphers after this manner, and make ſome Diſtinction between them.

The Dividend $\frac{3}{4}$, 750	00,750(0,058
The Diviſor 13 Integers	$\cancel{1}\cancel{3},\cancel{3}3$
	$\cancel{1}1$

Here you ſee nothing can be taken till you come to the third Figure, and ſo placing Cyphers in your Quotient work it according to the common Rules of Diviſion, and your Quotient ſhews 0, 058, which is equal to $\frac{3}{52}$, as before.

But

But if you will divide 13 by $\frac{3}{4}$, then set the $\frac{3}{4}$ next your left hand, and put 1 under 13, and it is $\frac{13}{1}$, set that toward your right hand, as appeareth in the Margin, and then work according to the Doctrine of the first Division, and you shall find that 13 being divided by $\frac{3}{4}$ bringeth into the Quotient $\frac{52}{3}$: Then divide 52 by 3, and thereof cometh 17 $\frac{1}{3}$, and so many times is $\frac{3}{4}$ contained in 13, as doth appear.

52
$\frac{3}{4}$ X $\frac{13}{1}$
3

~~11~~ 1
~~52~~ (17 $\frac{1}{3}$
~~33~~

By Decimals,

Note this well also for the setting of the Figures, for there is all the difficulty, and filling up the places with Cyphers.

	2
	555
The Dividend is 13	13000 (17
The Divisor $\frac{3}{4}$	7500
	77

Here you see I have proceeded as far as the place of the Integers, and now add three Cyphers to my Dividend, and then proceed thus,

```
222 2
5555 550
13000|000 (17,333
7500 000
755 55
777
```

So the Quotient shews 17 times and 333 parts, or $\frac{1}{3}$.

3. And

3. And if you will divide whole Numbers by whole Numbers and broken, or else whole Numbers and broken by whole Numbers, as to divide 20 by $5\frac{5}{6}$, you shall reduce $5\frac{5}{6}$ into broken, by the sixth Reduction, and it maketh $\frac{35}{6}$ for your Divisor; then put 1 under 20, and it will be $\frac{20}{1}$; then shall you multiply 35 by 1, and 20 by 6, as is taught in the other Divisions, and you shall find $\frac{120}{35}$.

$$\frac{35}{6} \times \frac{20}{1} \quad 120$$

Then divide 120 by 35, and you shall find in your Quotient 3 and $\frac{15}{35}$, which $\frac{15}{35}$ being abbreviated is $\frac{3}{7}$, and so many times is $5\frac{5}{6}$ contained in 20, as in the Margin appeareth.

35
1
35
120 ($3\frac{15}{35}$
35

In Decimals,

The Dividend	20,000|000 (3,428
The Divisor	5,833

But if you will divide $5\frac{5}{6}$ by 20, you shall have $\frac{35}{120}$, then you must divide 35 by 120, which you cannot divide, wherefore you shall abbreviate $\frac{35}{120}$ and thereof cometh $\frac{7}{24}$ for your Quotient.

In Decimals,

The Dividend $5\frac{5}{6}$	5,833 (0,292 *fere.*
The Divisor	20,000

4. If

4. If you will divide a broken Number by whole Numbers and broken, or else whole Numbers and broken by a broken Number, As to divide $\frac{1}{4}$ by $13\frac{2}{3}$, you must reduce $13\frac{2}{3}$ into his broken by the sixth Reduction, and they be $\frac{41}{3}$ for your Divisor, then multiply 41 by 4, and they make 164 for your Denominator, likewise multiply 3 by 3, and they make 9 for the Numerator, and then will your Sum be $\frac{9}{164}$, as appeareth in the Margin.

$$\begin{array}{c} 9 \\ \frac{41}{3} \times \frac{1}{4} \\ 164 \\ 41 \\ 13\frac{2}{3} \end{array}$$

In Decimals,

$$\begin{array}{lll} & & 66\,65 \\ \frac{1}{4} & & 00,750|000\ (0,055\ \textit{fere.} \\ 13\frac{2}{3} & & 13,667|777 \\ & & 1\,366\,66 \\ & & 136\,6 \\ & & 13 \end{array}$$

But if you will divide $13\frac{2}{3}$ by $\frac{1}{4}$, then you must divide 164 by 9, and you shall find $18\frac{2}{9}$.

In Decimals,

$$\begin{array}{lll} & & 6\,221 \\ 13\frac{2}{3} & & 13\,666|667\ (18,\ 222 \\ \frac{1}{4} & & 7\,555|550 \\ & & 777\,7 \end{array}$$

5. If you will divide whole Numbers and broken by whole Numbers and broken, as to divide $7\frac{1}{4}$ by $13\frac{2}{3}$, you must reduce the whole Numbers into their broken, by the Doctrine of the sixth Reduction: and you shall find $\frac{29}{4}$ for the $7\frac{1}{4}$, and $\frac{41}{3}$ for the $13\frac{2}{3}$.

Then

Then set down $4\frac{1}{3}$ toward the left hand, because it is your Divisor, and the $3\frac{1}{4}$ towards the right hand, and multiply 41 by 4, for your Denominator, and thereof cometh 164: and likewise multiply 31 by 3, for your Numerator, and it amounteth to 93, which will be thus, $\frac{93}{164}$ as before doth appear.

$$\begin{array}{ccc} & 93 & \\ \frac{41}{3} & \times & \frac{31}{4} \\ & 164 & \end{array}$$

In Decimals, $7\frac{1}{4}$ 7,750|000 (0,567
$13\frac{2}{3}$ 13,667

But if you will divide $13\frac{2}{3}$ by $7\frac{1}{4}$, you must (contrariwise to the other Example) divide 164 by 93; and you shall find in the Quotient $1\frac{71}{93}$.

In Decimals, $13\frac{2}{3}$ 13,666|667 (1,763
$7\frac{3}{4}$ 7,75

6. The broken Numbers of broken must be divided in such manner as broken Numbers are, and there is no difference, saving only that of divers and many broken Numbers you must make but two broken Numbers, that is to say, the one for the Divisor, and the other for the Dividend or Number to be divided.

Example, If you will divide the $\frac{1}{4}$ of $\frac{3}{5}$ of $\frac{1}{2}$ by the $\frac{2}{3}$ of $\frac{4}{7}$, you must understand that for the first, the $\frac{1}{4}$ of $\frac{3}{5}$ of $\frac{1}{2}$, are $\frac{3}{40}$ by the third Reduction; and the $\frac{2}{3}$ of $\frac{4}{7}$, are by the same Reduction $\frac{8}{21}$, then have you $\frac{8}{21}$ for

for your Divisor, and $\frac{9}{40}$ for your Number to be divided, then multiply 8 by 40, which maketh 320, set that under the Cross, and multiply 9 by 21; and thereof cometh 189, which set over the Cross for the Numerator, and they make $\frac{189}{320}$ for your Division; as doth appear.

$$\begin{array}{ccc} & 189 & \\ \frac{8}{21} & \times & \frac{9}{40} \\ & 320 & \end{array}$$

In Decimals, The $\frac{1}{2}$ is ,500, $\frac{3}{5}$ thereof is ,300.
$\frac{3}{4}$ thereof is ,225.
$\frac{4}{7}$ is ,571, $\frac{2}{3}$ of it is ,381.

	7
Dividend	$\cancel{2}\cancel{2}$5|000 (0,590
Divisor	$\cancel{3}$81

But if you would divide $\frac{8}{21}$ by $\frac{9}{40}$, you must work contrary to the last Example, that is to say, you must divide 320 by 189, and thereof cometh in the Quotient $1\frac{131}{189}$.

In Decimals,	Dividend	,381|000(1,693
	Divisor	,225

CHAP.

CHAP. IX.

Of Duplation, Triplation, Quadruplation of all Broken Numbers.

IF you will double any broken Number, you ſhall divide the ſame by $\frac{1}{2}$: likewiſe if you will triple any Fraction, you muſt divide it by $\frac{1}{3}$ - and to quadruple any broken Number, you ſhall divide it by $\frac{1}{4}$; and ſo is to be underſtood of all others.

Example of Duplation:

If you will double $\frac{3}{8}$, you ſhall divide $\frac{3}{8}$ by $\frac{1}{2}$, and thereof cometh $\frac{6}{8}$, which being abbreviated are $\frac{3}{4}$: as by Example.

$$\begin{array}{ccc} & 6 & \\ \frac{1}{2} & \times & \frac{3}{8} \\ & 8 & \end{array}$$

Or otherwiſe, in caſe the Denominator of any Fraction be an even Number, you may take half the ſaid Denominator, without any other Operation, and the Numerator to abide ſtill the Numerator, unto the ſaid half of the Denominator of the Fraction, as by the other Example before rehearſed, that is to ſay, of $\frac{3}{8}$ take $\frac{1}{2}$ of 8, which is 4, and that is the Denominator, and 3 remaineth ſtill Numerator to 4 and it maketh $\frac{3}{4}$, and ſo of all other. But in caſe the Denominator be an odd Number,

ber, that is to say, not even, then you may multiply the Numerator by 2, or else double the Numerator, which is all one, and that Fraction shall be doubled.

Example, if you will double $\frac{3}{5}$, you must only multiply the Numerator 3 by 2, and they by 6, which maketh that Fraction to be $\frac{6}{5}$, which 6 being divided by 5, bringeth $1\frac{1}{5}$, and so much is the double of $\frac{3}{5}$.

Example of Triplation.

If you will triple $\frac{3}{5}$, you must divide it by $\frac{1}{3}$, and thereof cometh $\frac{9}{5}$, which being divided bringeth $1\frac{4}{5}$, or otherwise, because the Denominator is an odd Number, you may multiply the Numerator 3 by 3, and thereof cometh 9, which maketh $\frac{9}{5}$, as before appeareth.

Example of Quadruplation.

If you will quadruple $\frac{4}{5}$, you shall divide $\frac{4}{5}$ by $\frac{1}{4}$, and thereof cometh $\frac{16}{5}$, which 16 being divided by 5 bringeth $3\frac{1}{5}$, or otherwise, because the Denominator of the Fraction is an odd Number, you shall multiply the Numerator of the $\frac{4}{5}$, that is to say, 4 by 4: and thereof cometh 16, which divide by 5, and you shall find $3\frac{1}{5}$, as before. And this sufficeth for Duplation, Triplation, and Quadruplation.

CHAP.

CHAP. X.

Of the Proof of broken Numbers, and first of Reduction.

IF you do abbreviate the broken Numbers which be reduced, you ſhall return them into their firſt eſtate, as by Example, if you reduce $\frac{2}{3}$ with $\frac{4}{5}$ you ſhall find $\frac{10}{15}$ and $\frac{12}{15}$; and then abbreviate $\frac{10}{15}$ and you ſhall find $\frac{2}{3}$, abbreviate likewiſe $\frac{12}{15}$, and thereof cometh $\frac{4}{5}$ as before.

The Proof of Abbreviation.

If you do multiply that Number, which you have abbreviated by that or thoſe Numbers by which you have abbreviated them, you ſhall return them again into their firſt eſtate.

Example, If you will abbreviate $\frac{32}{48}$ by 16, in taking the $\frac{1}{16}$ both of the Numerator and alſo of the Denominator, you ſhall find $\frac{2}{3}$, the Proof is thus, you muſt multiply both the Numerator and Denominator of $\frac{2}{3}$, that is to ſay, 3 by 16 maketh 48 for the Denominator, and 2 by 16 maketh 32 for the Numerator: then ſet the Numerator 32 over the Denominator 48, and they be $\frac{32}{48}$, as before.

The

The Proof of Addition.

If you ſubtract one of the Numbers, or many of them (which you have added) from the total Sum, there ſhall remain the other or others.

Example. If you add $\frac{1}{3}$ with $\frac{1}{4}$, you ſhall find $\frac{7}{12}$. The Proof is, if you ſubtract $\frac{1}{3}$ from $\frac{7}{12}$, you ſhall find remaining the other Number, which is $\frac{1}{4}$, or elſe if you do ſubtract $\frac{1}{4}$ from $\frac{7}{12}$ there will remain the other Number which is $\frac{1}{3}$.

The Proof of Subtraction.

If you add that Number which remaineth with the Number which you did ſubtract, you ſhall find the total Sum, out of which you made the abatement: or otherwiſe, if you add the two leſſer Numbers together, you ſhall find the greater.

Example. If you ſubtract $\frac{1}{4}$ from $\frac{1}{3}$, there will remain $\frac{1}{12}$. The Proof is thus, you muſt add $\frac{1}{12}$ and $\frac{1}{4}$ together, and you ſhall find $\frac{16}{48}$, which being abbreviated, doth make $\frac{1}{3}$, which is the greateſt Number.

The Proof of Multiplication.

If you divide the Product of the whole Multiplication, by the Multiplicator, you ſhall find in your Quotient, the Multiplicand or Number which you have multiplied: or elſe if you

divide the total Sum which is come of the Multiplication by the Multiplicand, you shall find in the Quotient the Multiplicator.

Example. If you multiply $\frac{2}{3}$ by $\frac{4}{5}$, the Product of this Multiplication will be $\frac{8}{15}$. The Proof is thus, you shall divide $\frac{8}{15}$ by the Multiplicator $\frac{4}{5}$, and thereof cometh $\frac{2}{3}$, which is the Multiplicand: or else divide $\frac{8}{15}$ by $\frac{2}{3}$, and you shall find the $\frac{4}{5}$, which is the Multiplicator.

The Proof of Division.

If you multiply the Quotient by the Divisor, you shall find the Number which you did divide, that is to say, your Dividend.

Example. If you divide $\frac{2}{3}$ by $\frac{3}{4}$, your Quotient will be $\frac{8}{9}$, The Proof is thus, you must multiply $\frac{8}{9}$ by $\frac{3}{4}$, and thereof cometh $\frac{24}{36}$, which being abbreviated are $\frac{2}{3}$, which is your Dividend: and by this manner all whole Numbers have their Proofs, as well as broken Numbers.

CHAP.

CHAP. XI.

Of certain Questions done by Broken Numbers, and first by Reduction.

FInd two Numbers, whereof the $\frac{2}{7}$ of the one Number may be equal to the $\frac{3}{8}$ of the other.

16 21
$\frac{2}{7}$ X $\frac{3}{8}$
6

Answ. You shall reduce $\frac{2}{7}$ and $\frac{3}{8}$ Cross-wise, and you shall find 16 over the $\frac{2}{7}$ and 21 over the $\frac{3}{8}$, which are the two Numbers that you seek: for the $\frac{3}{8}$ of 16 are 6, and so are the $\frac{2}{7}$ of 21, likewise 6.

2 Find two Numbers, whereof the $\frac{2}{3}$ of the one may be double unto the $\frac{1}{4}$ of the other.

Answ. Double $\frac{1}{4}$, and you shall have $\frac{2}{4}$, which being abbreviated is $\frac{1}{2}$: then reduce $\frac{2}{3}$ and $\frac{1}{2}$ Cross-wise, and you shall find 4 over the $\frac{2}{3}$, and 3 over the $\frac{1}{2}$, which are the two Numbers that you seek, for the $\frac{2}{3}$ of 3, which is 2, is double unto the $\frac{1}{4}$ of 4, which is but 1.

4 3
$\frac{2}{3}$ X $\frac{1}{2}$
2

3 Find two Numbers whereof the $\frac{1}{3}$ and the $\frac{1}{4}$ of the one, may be equal to the $\frac{1}{4}$ and $\frac{1}{5}$ of the other.

Answ. Add the $\frac{1}{3}$ and $\frac{1}{4}$ together, and they make $\frac{7}{12}$, then add $\frac{1}{4}$ and $\frac{1}{5}$ together, and they are

are $\frac{9}{20}$, then reduce $\frac{7}{12}$ and $\frac{9}{20}$ Cross-wise, and you shall have 140 over the $\frac{7}{12}$, and 108 over the $\frac{9}{20}$ which are the two Numbers that you seek. For 63 which are the $\frac{7}{12}$ of 108, are also the $\frac{9}{20}$ of 140.

140		108
$\frac{7}{12}$	X	$\frac{9}{20}$
	63	

4 Find two Numbers whereof the $\frac{1}{2}$ the $\frac{1}{3}$ and the $\frac{1}{4}$ of the one of them may be equal to the $\frac{1}{5}$ $\frac{1}{6}$ and $\frac{1}{7}$ of the other Number.

Answ. First, you must add $\frac{1}{2}$ $\frac{1}{3}$ and $\frac{1}{4}$ together, and they make $\frac{13}{12}$, then add $\frac{1}{5}$ $\frac{1}{6}$ and $\frac{1}{7}$ together, and they make $\frac{107}{210}$. Then reduce $\frac{13}{12}$ and $\frac{107}{210}$ Cross-wise, as by the first Question of Reduction, and you shall find 2730 over the $\frac{13}{12}$ and 1284 over the $\frac{107}{210}$, which are the two Numbers that you seek; for 1391 which is the $\frac{1}{2}$ the $\frac{1}{3}$ the $\frac{1}{4}$ of 1284: is like to the $\frac{1}{5}$ $\frac{1}{6}$ and $\frac{1}{7}$ of 2730 which is also 1391.

2730		1284
$\frac{13}{12}$	X	$\frac{107}{210}$
	1391	

5 Find three Numbers, whereof the $\frac{2}{5}$ of the first, the $\frac{3}{7}$ of the second, and $\frac{4}{9}$ of the third may be equal the one to the other.

Answ. Set down the $\frac{2}{5}$ $\frac{3}{7}$ and $\frac{4}{9}$, and then multiply the Denominator of the $\frac{2}{5}$, that is to say 5, by the Numerators of the other two Fractions, that is to say, by the Numerator of $\frac{3}{7}$ and by the Numerator of $\frac{4}{9}$, which is 3 and 4, and thereof cometh 60 for your first Number: then shall you multiply the Denominator of the $\frac{3}{7}$, which is 7, by the Numerators of $\frac{2}{5}$ and $\frac{4}{9}$, that

$\frac{2}{5}$	$\frac{3}{7}$	$\frac{4}{9}$
60	56	54
	24	

is to ſay, by 2 and 4, and thereof cometh 56, for the ſecond Number: Then multiply the Denominator of $\frac{4}{9}$, that is to ſay, 9 by the Numerator of $\frac{2}{5}$ and $\frac{3}{7}$, that is, by 2 and 3, and thereof cometh 54 for the third Number: Laſtly, Multiply the three Numerators, 2 by 3 is 6, and 6 by 4 makes 24, which ſet down under them. And thus the $\frac{2}{5}$ of 60, which is 24, is likewiſe the $\frac{3}{7}$ of 56, which is the ſecond Number, and is alſo the $\frac{4}{9}$ of 54, which is the third Number.

6 Find three Numbers of which the firſt and the ſecond may be in ſuch proportion as $\frac{1}{2}$ and $\frac{1}{3}$ and the ſecond and third in ſuch proportion as $\frac{1}{4}$ and $\frac{1}{5}$.

$$\begin{array}{ccc} 3 & & 2 \\ \frac{1}{2} & \times & \frac{1}{3} \\ & 6 & \end{array}$$

Anſw. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ Croſs-wiſe, and you ſhall have 3 over the $\frac{1}{2}$, and 2 over the $\frac{1}{3}$. Then reduce $\frac{1}{4}$ and $\frac{1}{5}$ in like manner, and you ſhall find 5 over the $\frac{1}{4}$, and 4 over the $\frac{1}{5}$. Then ſay by the Rule of Three, if 5 do give me 4, what ſhall 2 give me, which is the ſecond Proportional? multiply the ſecond Number 4, by the third Number 2, and thereof cometh 8, which divide by the firſt Number 5, and thereof cometh 1 $\frac{3}{5}$ for the third Proportional: and you ſhall find that 3, 2, 1 $\frac{3}{5}$ are the three Numbers proportional that I demand, or elſe 15, 10, and 8 in whole Numbers.

$$\begin{array}{ccc} 5 & & 4 \\ \frac{1}{4} & \times & \frac{1}{5} \\ & 20 & \end{array}$$

5 4 2 1$\frac{3}{5}$

Questions done by Addition in Fractions.

What Number is that, to which if you add 13 the whole amounteth to 31?

Answ. Subtract 13 from 31, and there will remain 18, which is the Number you seek.

2 What Number is that, to which if you add $\frac{2}{5}$, the Addition will be $\frac{5}{6}$?

Answ. Abate $\frac{2}{5}$ from $\frac{5}{6}$, and there will remain $\frac{13}{30}$, which is the Number you desire.

3. What Number is that, whereunto if you add $7\frac{2}{3}$, the whole Addition will be $12\frac{1}{4}$?

Answ. Abate $7\frac{2}{3}$ from $12\frac{1}{4}$, and the Remainder will be $4\frac{7}{12}$, which is the Number that you desire to know.

4 What Number is that whereunto if you add the $\frac{3}{4}$ of it self, that is to say, of the Number that you seek, the whole Addition may be $\frac{5}{6}$?

Answ. Here followeth a general Rule for all such Questions. First, Of 3, which is the Numerator of $\frac{3}{4}$, make still the Numerator; and likewise of 3 and 4 added together, which is both the Numerator and the Denominator of the $\frac{3}{4}$ make them your Denominator; so you shall find $\frac{3}{7}$. Then take the $\frac{3}{7}$ of $\frac{5}{6}$, which is $\frac{15}{42}$ or $\frac{5}{14}$, and subtract them from $\frac{5}{6}$, and there will remain $\frac{40}{84}$ or $\frac{10}{21}$, which is the Number that you seek.

$$\begin{array}{ccc} & 15 & \\ \frac{3}{7} & \times & \frac{5}{6} \\ & 42 & \end{array} \qquad \begin{array}{ccc} 30 & & 70 \\ \frac{5}{14} & \times & \frac{5}{6} \\ & 84 & \end{array} \qquad \frac{40}{84} \text{ or } \frac{10}{21}$$

5 What

5 What Number is that, to which if you add his own $\frac{2}{3}$, that is to say, $\frac{2}{3}$ of it self, the whole Addition shall be 20?

Answ. Do as in the last Question, of the Numerator of $\frac{2}{3}$, that is to say of 2, make still your Numerator, and likewise of the Numerator 2, and the Denominator 3 of the $\frac{2}{3}$, make of them both your Denominator, and you shall find $\frac{2}{5}$, then take the $\frac{2}{5}$ of 20 which are 8, and abate them from 20, and there will remain 12, which is the Number you desire: And so is to be done of all such like Questions.

Questions done by Subtraction in Fractions.

1 What Number is that, from which if you do abate 17, the rest may be 19?

Answ. Add 17 and 19 together, and you shall find 37, which is the Number that you seek.

2 What Number is that, from which if you abate $\frac{2}{5}$ the rest may be $\frac{1}{8}$?

Answ. Add $\frac{2}{5}$ and $\frac{1}{8}$ together, and you shall find $\frac{22}{40}$, which is the Number that you demand.

3 What Number is that, from which if you reduct $13\frac{1}{2}$, the rest may be $5\frac{5}{7}$?

Answ. Add $13\frac{1}{2}$ and $5\frac{5}{7}$ together, and thereof cometh $19\frac{3}{14}$, which is the Number that you seek.

4 What Number is that, from which if you subtract his $\frac{2}{5}$, that is to say, $\frac{2}{5}$ of it self, the rest may be 12?

Answ. The Rule for ſuch like Queſtions is thus, from the Denominator of $\frac{2}{5}$, which is 5, abate 2 which is his Numerator, and there reſteth 3 for the Denominator, and thus of $\frac{2}{5}$ you have now made $\frac{2}{3}$, then take the $\frac{2}{3}$ of 12 which are 8, and add them to 12, and thereof cometh 20, for the Number which you deſire.

5 What Number is that, from which if you do abate his $\frac{3}{4}$, the reſt may be $\frac{8}{9}$?

Answ. From the Denominator of $\frac{3}{4}$ which is 4, ſubtract his Numerator 3, and there reſteth 1, thus of $\frac{3}{4}$ you have made $\frac{3}{1}$. Then multiply $\frac{3}{1}$ by $\frac{8}{9}$, and thereof cometh 2 $\frac{2}{3}$, which add to $\frac{8}{9}$, and you ſhall have 3 $\frac{5}{9}$, which is the Number that you ſeek.

6 What Number is that from which if you abate his $\frac{4}{5}$, the reſt may be 12 $\frac{2}{3}$?

Answ. Do as you did in the laſt Queſtion, and you ſhall find that the $\frac{4}{5}$ will be $\frac{4}{1}$, therefore multiply 12 $\frac{2}{3}$ by $\frac{4}{1}$, and thereof cometh 50 $\frac{2}{3}$, which add unto 12 $\frac{2}{3}$, and you ſhall find 63 $\frac{1}{3}$, for the Number that you demand. And thus of all ſuch like Queſtions.

Queſtions of Multiplication in Fractions.

What Number is that, which being multiplied by 13, the whole Product of that Multiplication ſhall make 221?

Answ. Divide 221 by 13, and thereof cometh 17, which is the Number that you ſeek.

2 What Number is that which being multiplied by 15, the whole Multiplication will amount to $\frac{3}{4}$?

Answ.

Answ. Divide $\frac{3}{4}$ by $\frac{15}{1}$, and thereof cometh $\frac{1}{20}$, which is the Number that you seek.

3 What Number is that, which being multiplied by 21, the whole Multiplication will be $16\frac{4}{5}$?

Answ. Divide $16\frac{4}{5}$ by $\frac{21}{1}$, and you shall find $\frac{4}{5}$, and that is the Number that you demand.

4 What Number is that, which being multiplied by $\frac{3}{4}$, the Multiplication will amount to 18?

Answ. Divide $\frac{18}{1}$ by $\frac{3}{4}$, and thereof cometh 24, which is the Number that you desire to know.

5 What Number is that which if it be multiplied by $\frac{2}{3}$, the whole Multiplication will be $\frac{1}{4}$?

Answ. Divide $\frac{1}{4}$ by $\frac{2}{3}$, and the Quotient will be $\frac{3}{8}$, which is the Number that you require to know.

6 What Number is that which being multiplied by $\frac{5}{8}$, the Product of the Multiplication will be $16\frac{2}{3}$?

Answ. Divide $16\frac{2}{3}$ by $\frac{5}{8}$, and thereof cometh $26\frac{2}{3}$, which is the Number that you seek.

Other necessary Questions which are wrought by Multiplication in broken Numbers.

I demand how much the $\frac{5}{8}$ of 20 *s.* are worth, or what are the $\frac{5}{8}$ of 20 *s*?

Answ. You must multiply $\frac{5}{8}$ by $\frac{20}{1}$, and the Product will be $\frac{100}{8}$, therefore divide 100 by 8, and thereof cometh $12\frac{4}{8}$, which is to say,

12 *s.*

12 *s.* 6 *d.* and so much are the $\frac{5}{8}$ of 20 *s.* worth,

2 I demand what the $\frac{3}{4}$ of $\frac{5}{6}$ of a pound of money are worth, that is to say, of 20 *s*?

Answ. Multiply $\frac{3}{4}$ by $\frac{5}{6}$ and thereof cometh $\frac{5}{8}$: Then take the $\frac{5}{8}$ of 20 *s.* as in the last Question going before, and you shall find 12 *s.* 6 *d.* and so much are the $\frac{3}{4}$ of $\frac{5}{6}$ of 20 *s.* worth.

3 I demand what the $\frac{2}{3}$ of 8 *d.* $\frac{1}{2}$ are worth?

Answ. Multiply 8 $\frac{1}{2}$ by $\frac{2}{3}$, or else $\frac{2}{3}$ by 8 $\frac{1}{2}$, which is all one, and you shall find $\frac{34}{6}$: Then divide 34 by 6, and your Quotient will be 5 *d.* $\frac{2}{3}$, and so much are the $\frac{2}{3}$ of 8 *d.* $\frac{1}{2}$ worth.

4 What are the $\frac{3}{4}$ of 14 *d.* $\frac{3}{5}$?

Answ. Multiply 14 $\frac{3}{5}$ by $\frac{3}{4}$, and thereof cometh $\frac{219}{20}$: therefore divide 219 by 20, and your Quotient will be 10 *d.* $\frac{19}{20}$, and so much are the $\frac{3}{4}$ of 14 $\frac{3}{5}$.

5 How many quarters or fourth parts are contained in 7 $\frac{2}{3}$?

Answ. Multiply 7 $\frac{2}{3}$ by $\frac{4}{1}$ (because one whole containeth 4 quarters) and thereof cometh 30 $\frac{2}{3}$, and so many quarters are in the 7 $\frac{2}{3}$, that is to say 30 quarters and $\frac{2}{3}$ of a quarter.

6 How many thirds are in $\frac{3}{4}$ and $\frac{1}{2}$ that is to say, in 3 quarters and $\frac{1}{2}$ of one quarter or $\frac{1}{8}$, which are $\frac{7}{8}$ by the fifth Reduction?

Answ. Multiply $\frac{7}{8}$ by $\frac{3}{1}$ (because in 1 whole are contained 3 thirds) and thereof cometh 2 $\frac{5}{8}$, which 2 $\frac{5}{8}$ do signifie $\frac{2}{3}$ and $\frac{5}{8}$ of a third; and so many thirds are in $\frac{3}{4}$ and $\frac{1}{2}$ or in $\frac{7}{8}$ which is all one.

Questions done by Division in broken Numbers.

1 What Number is that, which being divided by 17, the Quotient will be 13?

Answ. Multiply 17 by 13, and thereof cometh 221, which is the Number that you seek.

2 What Number is that, which being divided by $\frac{3}{4}$, the Quotient will be 21?

Answ. Multiply $\frac{21}{1}$ by $\frac{3}{4}$, and thereof cometh $\frac{63}{4}$: Then divide 63 by 4, and thereof cometh $15\frac{3}{4}$, which is the Number that you seek.

3 What Number is that, which being divided by $\frac{1}{8}$, the Quotient will be $\frac{2}{3}$?

Answ. Multiply $\frac{2}{3}$ by $\frac{1}{8}$, and thereof cometh $\frac{2}{24}$, which being abbreviated are $\frac{1}{12}$ for the Number which you require.

4 What Number is that, which being divided by $\frac{4}{5}$, the Quotient will be $16\frac{2}{3}$?

Answ. Multiply $16\frac{2}{3}$ by $\frac{4}{5}$, and thereof cometh $\frac{200}{15}$: Therefore divide 200 by 15, and thereof cometh $13\frac{1}{3}$, which is the Number that you desire to find.

5 What Number is that, which being divided by $13\frac{1}{3}$, the Quotient will be 20?

Answ. Multiply $\frac{20}{1}$ by $13\frac{1}{3}$, and thereof cometh $\frac{800}{3}$, then divide 800 by 3, and thereof cometh $266\frac{2}{3}$ for the Number which you seek.

6 What Number is that, which if it be divided by $12\frac{1}{2}$, the Quotient will be $\frac{7}{8}$?

Answ. Multiply $12\frac{1}{2}$ by $\frac{7}{8}$, and thereof cometh $\frac{175}{16}$: Then divide 175 by 16, and thereof

of cometh 10 $\frac{15}{10}$ for the Number which you desire.

Other necessary Questions done by Division in broken Numbers.

I demand what part 30 is of 70?

Answ. Divide 30 by 70, which you cannot for they are $\frac{30}{70}$, but abbreviate them, and they are $\frac{3}{7}$: thus 30 are the $\frac{3}{7}$ of 70.

2 I demand what part 10 is of 16 $\frac{2}{3}$?

Answ. Divide $\frac{10}{1}$ by 16 $\frac{2}{3}$, and thereof cometh $\frac{30}{50}$, which being abbreviated are $\frac{3}{5}$, and thus 10 is found to be $\frac{3}{5}$ of 16 $\frac{2}{3}$.

3 *More,* $\frac{5}{8}$ of one unit, what part are they of 25?

Answ. Divide $\frac{5}{8}$ by $\frac{25}{1}$, and thereof cometh $\frac{5}{200}$, which being abbreviated is $\frac{1}{40}$, and thus $\frac{5}{8}$ of 1 is but the $\frac{1}{40}$ of 25.

4 *More,* $\frac{5}{6}$ what part are they of $\frac{7}{8}$?

Answ. Divide $\frac{5}{6}$ by $\frac{7}{8}$, and you shall find $\frac{40}{42}$, which abbreviated are $\frac{20}{21}$.

5 *More,* $\frac{4}{5}$ of 1 what part are they of 13 $\frac{1}{3}$?

Answ. Divide $\frac{4}{5}$ by 13 $\frac{1}{3}$, and you shall find $\frac{12}{200}$, which being abbreviated are $\frac{3}{50}$, and thus $\frac{4}{5}$ of 1 are the $\frac{3}{50}$ of 13 $\frac{1}{3}$.

6 *More,* 12 $\frac{1}{2}$ what part are they of 30?

Answ. Divide 12 $\frac{1}{2}$ by $\frac{30}{1}$, and you shall find $\frac{25}{60}$, which being abbreviated are $\frac{5}{12}$, and thus 12 $\frac{1}{2}$ are the $\frac{5}{12}$ of 30.

7 *More,* 16 $\frac{2}{3}$ what part are they of 57 $\frac{1}{7}$?

Answ. Divide 16 $\frac{2}{3}$ by 57 $\frac{1}{7}$, and thereof cometh $\frac{350}{1200}$, which being abbreviated are $\frac{7}{24}$, and thus 16 $\frac{2}{3}$ are the $\frac{7}{24}$ of 57 $\frac{1}{7}$.

8 *More,*

8 *More*, $\frac{1}{4}$ and $\frac{2}{3}$ of $\frac{1}{4}$, or 3 quarters, and $\frac{2}{3}$ of one quarter, what part are they of 1?

Answ. Reduce $\frac{3}{4}$ and the $\frac{2}{3}$ of $\frac{1}{4}$ into one broken Number by the fifth Reduction, and you shall find $\frac{11}{12}$, and thus the $\frac{3}{4}$ and $\frac{2}{3}$ of $\frac{1}{4}$ are the $\frac{11}{12}$ of 1 whole.

9 *More*, Of what Number is 9 the $\frac{2}{3}$?

Answ. Divide 9 by $\frac{2}{3}$, and thereof cometh $13\frac{1}{2}$, which is the Number whereof 9 is the $\frac{2}{3}$.

10 *More*, Of what Number are $\frac{2}{5}$ the $\frac{1}{4}$?

Answ. Divide $\frac{2}{5}$ by $\frac{1}{4}$, and thereof cometh $1\frac{3}{5}$, which is the Number whereof $\frac{2}{5}$ are the $\frac{1}{4}$ of the same Number.

11 *More*, Of what Number are $5\frac{3}{4}$ the $\frac{3}{7}$?

Answ. Divide $5\frac{3}{4}$ by $\frac{3}{7}$ and you shall find $13\frac{5}{12}$, which is the Number whereof $5\frac{3}{4}$ are the $\frac{3}{7}$.

12 *More*, $9\frac{2}{3}$ what part are they of $33\frac{1}{2}$?

Answ. Divide $9\frac{2}{3}$ by $33\frac{1}{2}$, and thereof cometh $\frac{58}{201}$, and thus $9\frac{2}{3}$ are the $\frac{58}{201}$ of $33\frac{1}{2}$, as appeareth.

The End of the Second Part.

THE THIRD PART OF ARITHMETICK,

Treating of

Certain brief Rules, called, *Rules of Practice*: With divers necessary *Questions* profitable not only for *Merchants*, but also for all other *Occupiers*.

THE Intent of these following Rules of Practice is to shew readily the true Price or Value of any parcel of Goods bought or sold by the Pound, Yard, Ell, Dozen, Gross, or any other way.

Now in the first place the plain ordinary way to do this, is by reducing the Price of the Pound, Yard, or Ell, and so the whole Parcel into the lowest Denomination of usual Moneys by Multiplication, and then reduce it again into pounds, shillings, and Pence by Division, as is partly shewed before in the Chapter of Reduction.

For Example. At a Farthing a pound, what are 48000 pounds weight worth?

Here a Farthing being the only and lowest Deno-

Denomination mentioned, needs no lower Reduction, but it is plain the parcel is worth 48000 Farthings. But now to know how many pounds this is, First, Reduce this Sum into Shillings, by dividing it by 48, because there are 48 Farthings in every Shilling; So you shall find it yields 1000 *sh.* then divide this 1000 by 20, to bring it into pounds, and it yields just 50 *l.*

		l.
48000 (	1000 (	50
48	20	

At some times you may ease your self of Division, by halving, or some easie parting of the Number, As in the former Example.

	48000	*Farthings,*	
are	24000	*Half-pence,*	*which*
are	12000	*Pence,*	*which*
are	6000	*Two pences,*	*which*
are	3000	*Groats,*	*which*
are	1000	*Shillings,*	

Which divided by 20 makes 50 *l.* as before.

At an half-peny a pound what comes 9648 *l.* to?

The lowest Sum being an half-peny, and there being 24 half-pence in a Shilling, if you divide 9648 by 24, you shall find 402 *s.* which make 20 *l.* 2 *s.*

		l.	*s.*
9648 (	402 (	20	2
2444	20		
22			

At 3 Farthings a pound, what 10000 weight?

10000	*farth.*	*s.*	*l.*	*s.*
3	30000 (	625 (	31	5
30000	48	20		

First, 10000 times 3 Farthings is 30000 Farthings,

Farthings, which divided by 48 make 625 *s.* which is 31 *l.* 5 *s.*

At 1 Peny the pound, what 24000 weight?

Divide by 12 to bring it	*pence.*	*s.*	*l.*
into shillings, then by 20	24000(	2000(	100
for pounds.	12	2	0

But any other Number of pence you must first bring into single pence.

At 9 *d.* the pound, what 4000 weight?

	pence.	*s.*	*l.*
4000	1		
9	36000 (	3000 (	150
36000	12	22	0

Thus you may bring any Sum readily into pence and so into shillings and then into pounds, without troubling your self with many of the following Rules, which are of no great use, unless the price fall out to be the even or aliquot parts of a shilling or pound. Only take one Rule to help you to bring any Number of shillings readily into pounds without Division, which is this. Cut off the last Figure from your Number, and then take half of the rest.

Example, In 4682 *sh.* how many pounds?

Cut off the Figure 2, then say the half of 4 is 2, the half of 6 is 3, and the half of 8 is 4, which makes 234 *l.*

	l.	*s.*
468|2 ——	234	2

and the 2 cut off shews the odd shillings.

But if the Figures be odd Numbers, you must in the halving abate one, and carry it to the next, where it makes 10.

Example,

Example,

In 3579 shillings how many pounds?

Cut off the last figure 9, and then say, the half of 3 I cannot, therefore I take the lesser half thereof which is 1, and carry 10 to the next Figure, saying, the half of 15 is 7, abating 1 as before, and the lesser half of 17 is 8, still carrying 10 to the last so it makes 178 *l.* 19 *s.*

	l.	*s.*
357|9—	178	19

But for the more easie performance of these things and also for the proof of the work, I have added these Tables of Practice, or Manual of Accounts, shewing how much any Number of Pounds, Yards, Ells, *&c.* of any Commodity comes to at any Price, only by adding two or three of the Sums together.

A large Table of Accounts for the ready casting up of the true Value of any great Number of any Commodities bought or sold by the Pound, Yard, Ell, &c.

Number of Ells or such like.	1 Farthing.				2 Farthings.				3 Farthings.			
	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.
1				1				2				3
2				2			1	0			1	2
3				3			1	2			2	1
4			1	0			2	0			3	0
5			1	1			2	2			3	3
6			1	2			3	0			4	2
7			1	3			3	2			5	1
8			2	0			4	0			6	0
9			2	1			4	2			6	3
10			2	2			5	0			7	2
20			5	0			10	0		1	3	0
30			7	2		1	3	0		1	10	2
40			10	0		1	8	0		2	6	0
50		1	0	2		2	1	0		3	1	2
60		1	0	3		2	6	0		3	9	0
70		1	5	2		2	11	0		4	4	2
80		1	8	0		3	4	0		5	6	0
90		1	10	2		3	9	0		5	7	2
100		2	1	0		4	2	0		6	3	0
200		4	2	0		8	4	0		12	6	0
300		6	3	0		12	6	0		18	9	0
400		8	4	0		16	8	0	1	5	0	0
500		10	5	0	1	0	10	0	1	11	3	0
600		12	6	0	1	5	0	0	1	17	6	0
700		14	7	0	1	9	2	0	2	3	9	0
800		16	8	0	1	13	4	0	2	10	0	0
900		18	9	0	1	17	6	0	2	16	3	0
1000	1	0	10	0	2	1	8	0	3	2	6	0
2000	2	1	8	0	4	3	4	0	6	5	0	0
3000	3	2	6	0	6	5	0	0	9	7	6	0
4000	4	3	4	0	8	6	8	0	12	10	0	0
5000	5	4	2	0	10	8	4	0	15	12	6	0
6000	6	5	0	0	12	10	0	0	18	15	0	0
7000	7	5	10	0	14	11	8	0	21	17	6	0
8000	8	6	8	0	16	13	4	0	25	0	0	0
9000	9	7	6	0	18	15	0	0	28	2	6	0
10000	10	8	4	0	20	16	8	0	31	5	9	0

Number of Ells or such like.	*1 Peny.*			*2 Pence.*			*3 Pence.*		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
1			1			2			3
2			2			4			6
3			3			6			9
4			4			8		1	0
5			5			10		1	3
6			6		1	0		1	6
7			7		1	2		1	9
8			8		1	4		2	0
9			9		1	6		2	3
10			10		1	8		2	6
20		1	8		3	4		5	0
30		2	6		5	0		7	6
40		3	4		6	8		10	0
50		4	2		8	4		12	6
60		5	0		10	0		15	0
70		5	10		11	8		17	6
80		6	8		13	4	1	0	0
90		7	6		15	0	1	2	6
100		8	4		10	8	1	5	0
200		16	8	1	13	4	2	10	0
300	1	5	0	2	10	0	3	15	0
400	1	13	4	3	6	8	5	0	0
500	2	1	8	4	3	4	6	5	0
600	2	10	0	5	0	0	7	10	0
700	2	18	4	5	16	8	8	15	0
800	3	6	8	6	13	4	10	0	0
900	3	15	0	7	10	0	11	5	0
1000	4	3	4	8	6	8	12	10	0
2000	8	6	8	16	13	4	25	0	0
3000	12	10	0	25	0	0	37	10	0
4000	16	13	4	33	6	8	50	0	0
5000	20	16	8	41	13	4	62	10	0
6000	25	0	0	50	0	0	75	0	0
7020	29	3	4	58	6	8	87	10	0
8000	33	6	8	66	13	4	100	0	0
9000	37	10	0	75	0	0	112	10	0
10000	41	13	4	83	6	8	125	0	0

Number of Ells or such like.	4 Pence.			5 Pence.			6 Pence.		
	l.	s.	d.	l.	s.	d.	l.	s.	d.
1			4			5			6
2			8			10		1	0
3		1	0		1	3		1	6
4		1	4		1	8		2	0
5		1	8		2	1		2	6
6		2	0		2	6		3	0
7		2	4		2	11		3	6
8		2	8		3	4		4	0
9		3	0		3	9		4	6
10		3	4		4	2		5	0
20		6	8		8	4		10	0
30		10	0		12	6		15	0
40		13	4		16	8	1	0	0
50		16	8	1	0	10	1	5	0
60	1	0	0	1	5	0	1	10	0
70	1	3	4	1	9	2	1	15	0
80	1	6	8	1	13	4	2	0	0
90	1	10	0	1	17	6	2	5	0
100	1	13	4	2	1	8	2	10	0
200	3	6	8	4	3	4	5	0	0
300	5	0	0	6	5	0	7	10	0
400	6	13	4	8	6	8	10	0	0
500	8	6	8	10	8	4	12	10	0
600	10	0	0	12	10	0	15	0	0
700	11	13	4	14	11	8	17	10	0
800	13	6	8	16	13	4	20	0	0
900	15	0	0	18	15	0	22	10	0
1000	16	13	4	20	16	8	25	0	0
2000	33	6	8	41	13	4	50	0	0
3000	50	0	0	62	10	0	75	0	0
4000	66	13	4	83	6	8	100	0	0
5000	83	6	8	104	3	4	125	0	0
6000	100	0	0	125	0	0	150	0	0
7000	116	13	4	145	16	8	175	0	0
8000	133	6	8	166	13	4	200	0	0
9000	150	0	0	187	10	0	225	0	0
10000	166	13	4	208	6	8	250	0	0

Number of Ells or such like.	7 Pence.			8 Pence.			9 Pence.		
	l.	s.	d.	l.	s.	d.	l.	s.	d
1			7			8			9
2		1	2		1	4		1	6
3		1	9		2	0		2	3
4		2	4		2	8		3	6
5		2	11		3	4		3	9
6		3	6		4	0		4	6
7		4	1		4	8		5	3
8		4	8		5	4		6	0
9		5	3		6	0		6	9
10		5	10		6	8		7	6
20		11	8		13	4		15	0
30		17	6	1	0	0	1	2	6
40	1	3	4	1	6	8	1	10	0
50	1	9	2	1	13	4	1	17	6
60	1	12	0	2	0	0	2	5	0
70	2	0	10	2	6	8	2	12	6
80	2	6	8	3	13	4	3	0	0
90	2	12	6	3	0	0	3	7	6
100	2	18	4	3	6	8	3	15	6
200	5	16	8	6	13	4	7	10	0
300	8	15	0	10	0	0	11	5	0
400	11	13	4	13	6	8	15	0	0
500	14	11	8	16	13	4	18	15	0
600	17	10	0	20	0	0	22	10	0
700	20	8	4	23	6	8	26	5	0
800	23	6	8	26	13	4	30	0	0
900	26	5	0	30	0	0	33	15	0
1000	29	3	4	33	6	8	37	10	0
2000	58	6	8	66	13	4	75	0	0
3000	87	10	0	100	0	0	112	10	0
4000	116	13	4	133	6	8	150	0	0
5000	145	16	8	166	13	4	187	10	0
6000	175	0	0	200	0	0	225	0	0
7000	204	3	4	233	6	8	262	10	0
8000	233	6	8	266	13	4	300	0	0
9000	262	10	0	300	0	0	337	10	0
10000	291	13	4	333	6	8	375	0	0

Number of Ells or such like.	10 Pence.			11 Pence.			12 Pen.		2 Shill.	
	l.	s.	d.	l.	s.	d.	l.	s.	l.	s.
1			10			11		1		2
2		1	8		1	10		2		4
3		2	6		2	9		3		6
4		3	4		3	8		4		8
5		4	2		4	7		5		10
6		5	0		5	6		6		12
7		5	10		6	5		7		14
8		6	8		7	4		8		16
9		7	6		8	3		9		18
10		8	4		9	2		10	1	0
20		16	8		18	4	1	0	2	0
30	1	5	0	1	7	6	1	10	3	0
40	1	13	4	1	16	8	2	0	4	0
50	2	1	8	2	5	10	2	10	5	0
60	2	10	0	2	15	0	3	0	6	0
70	2	18	4	3	4	2	3	10	7	0
80	3	6	8	3	13	4	4	0	8	0
90	3	15	0	4	2	6	4	10	9	0
100	4	3	4	4	11	8	5	0	10	0
200	8	6	8	9	3	4	10	0	20	0
300	12	10	0	13	15	0	15	0	30	0
400	16	13	4	18	6	8	20	0	40	0
500	20	16	8	22	18	4	25	0	50	0
600	25	0	0	27	10	0	30	0	60	0
700	29	3	4	32	1	8	35	0	70	0
800	33	6	8	36	13	4	40	0	80	0
900	37	10	0	41	5	0	45	0	90	0
1000	41	13	4	45	16	8	50	0	100	0
2000	83	6	8	91	13	4	100	0	200	0
3000	125	0	0	137	10	0	150	0	300	0
4000	166	13	4	183	6	8	200	0	400	0
5000	208	6	8	229	3	4	250	0	500	0
6000	250	0	0	275	0	0	300	0	600	0
7000	291	13	4	320	16	8	350	0	700	0
8000	333	6	8	366	13	4	400	0	800	0
9000	375	0	0	412	10	0	450	0	900	0
10000	416	13	4	458	6	8	500	0	1000	0

Number of Ells or such like.	3 Shill. l.	3 Shill. s.	4 Shill. l.	4 Shill. s.	5 Shill. l.	5 Shill. s.	6 Shill. l.	6 Shill. s.
1		3		4		5		0
2		6		8		10		12
3		9		12		15		18
4		12		16	1	0	1	4
5		15	1	0	1	5	1	10
6		18	1	4	1	10	1	16
7	1	1	1	8	1	15	2	2
8	1	4	1	12	2	5	2	8
9	1	7	1	16	2	0	2	14
10	1	10	2	0	2	10	3	0
20	3	0	4	0	5	0	6	0
30	4	10	6	0	7	10	9	0
40	6	0	8	0	10	0	12	0
50	7	10	10	0	12	10	15	0
60	9	0	12	0	15	0	18	0
70	10	10	14	0	17	10	21	0
80	12	0	16	0	20	0	24	0
90	13	10	18	0	22	10	27	0
100	15	0	20	0	25	0	30	0
200	30	0	40	0	50	0	60	0
300	45	0	60	0	75	0	90	0
400	60	0	80	0	100	0	120	0
500	75	0	100	0	125	0	150	0
600	90	0	120	0	150	0	180	0
700	105	0	140	0	175	0	210	0
800	120	0	160	0	200	0	240	0
900	135	0	180	0	225	0	270	0
1000	150	0	200	0	250	0	300	0
2000	300	0	400	0	500	0	600	0
3000	450	0	600	0	750	0	900	0
4000	600	0	800	0	1000	0	1200	0
5000	750	0	1000	0	1250	0	1500	0
6000	900	0	1200	0	1500	0	1800	0
7000	1500	0	1400	0	1750	0	2100	0
8000	1200	0	1600	0	2000	0	2400	0
9000	1350	0	1800	0	2250	0	2700	0
10000	1500	0	2000	0	2500	0	3000	0

Number of Ells or such like.	7 Shill. l.	s.	8 Shill. l.	s.	9 Shill. l.	s.	10 Shill. l.	s.
1		7		8		9		10
2		14		16		18	1	0
3	1	1	1	4	1	7	1	10
4	1	8	1	12	1	16	2	0
5	2	15	2	0	2	5	2	10
6	2	2	2	8	2	14	3	0
7	2	9	2	6	3	3	3	10
8	3	16	3	4	3	12	4	0
9	3	3	3	12	4	1	4	10
10	3	10	4	0	4	10	5	0
20	7	0	8	0	9	0	10	0
30	10	10	12	0	13	10	15	0
40	14	0	16	0	18	0	20	0
50	17	10	20	0	22	10	25	0
60	21	0	24	0	27	0	30	0
70	24	10	28	0	31	10	35	0
80	28	0	32	0	36	0	40	0
90	31	10	36	0	40	10	45	0
100	35	0	40	0	45	0	50	0
200	70	0	80	0	90	0	100	0
300	105	0	120	0	135	0	150	0
400	140	0	160	0	180	0	200	0
500	175	0	200	0	225	0	250	0
600	210	0	240	0	270	0	300	0
700	245	0	280	0	315	0	350	0
800	280	0	320	0	360	0	400	0
900	315	0	360	0	405	0	450	0
1000	350	0	400	0	450	0	500	0
2000	700	0	800	0	900	0	1000	0
3000	1050	0	1200	0	1350	0	1500	0
4000	1400	0	1600	0	1800	0	2000	0
5000	1750	0	2000	0	2250	0	2500	0
6000	2100	0	2400	0	2700	0	3000	0
7000	2450	0	2800	0	3150	0	3500	0
8000	2800	0	3200	0	3600	0	4000	0
9000	3150	0	3600	0	4050	0	4500	0
10000	3500	0	4000	0	4500	0	5000	0

Example, What will 5000 Ells of Lockram at 11 *d.* the Ell come to?

First, Look the Price of the Ell, 11 *d.* at the head of the Table, and then look for the Number of the Ells, 5000 on the side of the Table, and in the square meeting thereof you shall find that 5000 Yards, Ells, or Pounds of any thing at 11 *d.* the Yard, Ell, or Pound comes to 229 *l.* 3 *s.* 4 *d.*

Secondly, If you cannot find your whole Price together, or your whole Number of things together in one Line, you may part it into two or three parts.

Thus if you would know what 1500 Ells at 9 *d.* $\frac{1}{2}$ come to.

First, you may find for the 9 pence.

		l.	*s.*	*d.*
1000	nine pences are	37	10	0
500		18	15	0

Then for the half-pence.

1000	half-pence are	02	01	8
500		01	00	10
	In all	59	07	6

You may contrive to make the Work shorter, if you divide your Number so that they may lie together in the Table, and so add them together as you write them down: Thus 700 and 800 make 1500.

	l.	*s.*	*d.*
So 700 and 800 nine pences make	56	5	0
Then 700 and 800 half-pence make	3	2	6
In all	59	7	6

The

The Uſe of the Table is very plain and of great Uſe, eſpecially for ſuch as are not much uſed to caſt up ſuch Accounts: For others that deſire to perform this by Art, they muſt obſerve either the foregoing or theſe following Rules of Practice, which in many caſes are very neat and neceſſary, and ſhorten the foreſaid work very much.

CHAP. I.

The Rules of Practice.

SOme there be, who call theſe Rules of Practice, Brief Rules, becauſe by them many Queſtions may be done with quicker expedition, than by the Rule of Three: there be others who call them, The ſmall Multiplication, becauſe the Product is alwaies leſs in Quantity than the Number which is to be multiplied: This Practice cometh not in uſe, but only amongſt ſmall kinds of Numbers, which have over them other Numbers that are greater. And this being well conſidered, is no other thing but to convert leſſer and particular kinds of Numbers into greater; which may be done by Diviſion, in taking the half, the third, the fourth, the fifth, or ſuch other parts of the Sum which is to be multiplied, as the Multiplier is part of his greater kind, and that which

which cometh thereof, is worth as much (not in Quantity, but in his own Form and Quality) as if you did multiply simply the two Sums, one by the other: and for the better understanding of such conversions, you must have respect to one of these two considerations: the first is, when one would demand this Question, At 6 *d.* the Yard of Cotton, what are 18 Yards worth at that Price? It is manifest they are worth 18 pieces of 6 *d.* the piece, or 18 half shillings, which must be turned into shillings in taking the half of 18 *s.* and they make 9 *s.* Or otherwise you must consider that at 1 *s.* the Yard, the 18 Yards are worth 18 *s.* therefore at 6 *d.* they shall be but half so much, for 6 *d.* is but the $\frac{1}{2}$ of 1 *s.* Therefore you must take the $\frac{1}{2}$ of 18 *s.* and they make 9 *s.* which are worth as much as 108 *d.* that is to say, as 18 times 6 pence.

First, If you will multiply any Number after this manner by pence, whereof the Number of the same pence do not extend unto 12, and thereof to bring shillings into the Product, you must know the aliquot or even parts of a Shilling, that is such a Number of pence by which a Shilling may be divided, and nothing remain. 1 Rule.

The even Parts of a Shilling are these.

The half is 6 *d.*	A sixth part is 2 *d.*
A third part is 4 *d.*	An 8th. part is 1 *d.* $\frac{1}{2}$
A quarter is 3 *d.*	A 12th. part is 1 *d.*

Then for 6 *d.* which is the half of 1 *s.* you must take the $\frac{1}{2}$ of all the Number which is to be multiplied, and that which cometh thereof shall

ſhall be Shillings: if there do remain 1, it is 6 pence.

For 4 pence you muſt take the $\frac{1}{3}$ of all the Number that is to be multiplied; and if any units do remain, they ſhall be thirds of a Shilling, every one being in value 4 *d.*

For 3 pence you muſt take the $\frac{1}{4}$ of all the ſum: if any units do remain they ſhall be fourths of a Shilling, every one being worth 3 pence.

For 2 pence you muſt take the $\frac{1}{6}$ of all the Sum, and if any units do remain, they ſhall be 6 parts of a Shilling, being every one of them worth 2 pence.

For 1 peny take the $\frac{1}{12}$ of the whole Sum, if any units do remain, they are the twelfth part of a Shilling, each of them being in value 1 *d.* as by theſe Examples following doth plainly appears

Example, I.

At 6 *d.* the Yard, what are 59 Yards worth?

	~~1~~1	*s. d.*
The $\frac{1}{2}$ of 59 is	~~59~~	(29 6
	~~22~~	

II. At 4 *d.* the Yard, what 82 Yards?

	~~2~~1	*s. d.*
$\frac{1}{3}$ of 82 is	~~82~~	(27 4
	~~33~~	

III. At 3 *d.* the Yard, what 97 Yards?

	~~1~~1	*s. d.*
$\frac{1}{4}$ of 97 is	~~97~~	(24 3
	~~44~~	

IV. At

IV. At 2 *d.* the Yard, what 346 Yards?

	4	*s.*	*d.*
$\frac{1}{6}$ of 346 is	~~346~~	(57	8
	~~66~~		

V. At 1 *d.* the Yard, what 343 Yards?

	~~107~~	*s.*	*d.*
$\frac{1}{12}$ of 343 is	~~343~~	(28	7
	~~122~~		
	~~1~~		

2 Rule.

But if the Number of the pence be not an aliquot part of 12, you muſt reduce them into ſome aliquot parts of 12; and after the aforeſaid manner, you ſhall make of them two or three Products as need ſhall require, and add them together into one Sum; as 5 *d.* may be reduced into 4 *d.* and 1 *d.* or elſe into 3 *d.* and 2 *d.* for 4 *d.* and 1 *d.* do make 5 *d.* and ſo do 3 *d.* and 2 *d.* the like. Wherefore if you will work by 4, and by 1; you muſt for 4 *d.* take firſt the $\frac{1}{3}$ of the Number that is to be multiplied, and for 1 *d.* take the $\frac{1}{12}$ of the whole Sum, or rather for 1 *d.* ye may take the $\frac{1}{4}$ of the Product, which came of the 4 *d.* becauſe 1 *d.* is the $\frac{1}{4}$ of 4 *d.* But if you will work by 3 *d.* and 2 *d.* you ſhall take for 3 *d.* the $\frac{1}{4}$ of the Number which is to be multiplied: and likewiſe for 2 *d.* the $\frac{1}{6}$ of the ſame Number, adding together both the Products: The total Sum of thoſe two Numbers ſhall be the ſolution to the Queſtion. And in like manner is to be done of all others; As by theſe Examples following may appear.

At

At 5 *d.* the Yard, what are 49 Yards worth?

	s.	*d.*
For 4 *d.* take $\frac{1}{3}$ of 49	16	4
For 1 *d.* take $\frac{1}{12}$ of 49 or $\frac{1}{4}$ of the former Sum.	4	1
In all	20	5

At 7 *d.* the pound, what will 54 *l.* cost?

	s.	*d.*
For 4 *d.* take $\frac{1}{3}$ of 54	18	0
For 3 *d.* take $\frac{1}{4}$ of 54	13	6
In all	31	6

At 8 *d.* the pound, what will 40 *l.* cost?

	s.	*d.*
For 4 *d.* take $\frac{1}{3}$ of 40	13	4
For 4 *d.* take $\frac{1}{3}$ of 40	13	4
In all	26	8

At 8 *d.* the pound, what 40 pound?

	s.	*d.*
For 6 *d.* take $\frac{1}{2}$ of 40	20	0
For 2 *d.* take $\frac{1}{6}$ of 40 or $\frac{1}{3}$ of the whole Sum.	6	8
In all	26	8

At 9 *d.* the Yard, what 73 Yards?

	s.	*d.*
For 6 *d.* take $\frac{1}{2}$ of 73	36	6
For 3 *d.* take $\frac{1}{4}$ of 73 or $\frac{1}{2}$ of the former Sum.	18	3
In all	54	9

At 10 *d.* the Ell, what 32 Ells?

	s.	*d.*
For 6 *d.* take $\frac{1}{2}$ of 32	16	0
For 4 *d.* take $\frac{1}{3}$ of 32	10	8
In all	26	8

At 11 *d.* the Ell, what 27 Ells?

	s.	*d.*
For 4 *d.* take $\frac{1}{3}$ of 27	9	0
For 4 *d.* take $\frac{1}{3}$ again	9	0
For 3 *d.* take $\frac{1}{4}$	6	9
In all	24	9

Likewise by the same reason, when you will multiply by Shillings any Number that is under 20 *s.* you shall have in the Product pounds, if you know the aliquot parts of 20 *s.* which are these: 3 Rule.

10 *s.* is the $\frac{1}{2}$ }
5 is the 4 }
4 is the $\frac{1}{5}$ } part of a pound or 20 *s.*
2 is the 10 }
1 is the 20 }

Then for 10 *s.* which is the $\frac{1}{2}$ of a pound, you must take $\frac{1}{2}$ of that Number, which is to be multiplied, and you shall have pounds in the Product. If there do remain 1, it shall be worth 10 *s.*

For 5 *s.* you must take the $\frac{1}{4}$ of the Number, which is to be multiplied, and if there remain any units, they shall be fourth parts of a pound, every unit being in value 5 *s.*

For 4 *s.* you must take $\frac{1}{5}$ of the Number which is

is to be multiplied; and if there do remain any units, they shall be fifth parts of a pound, every unit being worth 4 *s.*

At 10 *s.* the Yard, what 75 Yards?

For 10 *s.* take $\frac{1}{2}$ of 75 (37 *l.* 10 *s.*
2

At 5 *s.* the Yard, what 89 Yards?

For 5 *s.* take $\frac{1}{4}$ of 89 (22 *l.* 5 *s.*
4

At 4 *s.* the Yard, what 93 Yards?

For 4 *s.* take $\frac{1}{5}$ of 93 (18 *l.* 12 *s.*
5

4 Rule. For 2 *s.* you must take the $\frac{1}{10}$ of the Number that is to be multiplied. Wherefore if you will take the $\frac{1}{10}$ of any Number, you must separate the last Figure of the same Number (which is nearest your right hand) from all the other Figures, with a small stroke or dash with a pen. For all the other Figures which do remain towards your left hand, from the same Figure that you do separate shall be the said $\frac{1}{10}$ of a pound; and that Figure so separated toward your right hand, shall be so many pieces of 2 *s.* the piece, which Figure must be doubled to make thereof Shillings, as by these Examples appeareth.

At 2 *s.* the Pound, what 98 Pounds?

9|8 or 9 *l.* 16 *s.*

At 2 *s.* the Dozen, what 403 Dozens?

40|3 or 40 *l.* 6 *s.*

Hereupon dependeth another exact way to multiply by shillings (if the Number of Shillings be even) which is thus: you shall take $\frac{1}{2}$ of the Number of the same shillings, and convert them into pieces of 2 *s.* then by the Number

ber of this half, you must first multiply the last Figure, toward your right hand) of the Number which is to be multiplied; and if there be any tens in the same Product, those must you reserve in your mind; But (if with the same, or else without the same) you do find any digit Number, the same digit Number shall you double and put it into the place of shillings. Then must you proceed to the Multiplication of the other Figures, adding to the Product, the tens which you before reserved: and thereof shall come pounds.

Now for your better understanding of this which hath been said, and by the way of Example, I will propound unto you this Question.

At 8 *s.* the Gross, what are 97 Gross worth after the rate?

First, In this Example I take half the Number of shillings, as before is taught, that is to say, of 8 *s.* which is 4 *s.* this 4 *s.* I put under the Number of Yards or Ells to multiply the Sum thereby, as you may see by these Examples.

Now in this first Example, where it is demanded at 8 *s.* the Gross, what are 97 Gross? First, the $\frac{1}{2}$ of 8 *s.* which is 4 *s.* being set under the Multiplicand 97, as before is said: Then I multiply the 97 by 4, saying first, 4 times 7 is 28, I double the digit Number 8, and that maketh 16, which 16 I put under the Line, in the place of Shillings, and I keep the two tens in my mind, which here in work represent 2 *l.* Then Secondly,

At 8 s. *the Gross,*
What 97 *Gross,*
4
———
38 *l.* 16 *s.*

P I

I multiply 9 by the said 4, and thereof cometh 36, whereto I add the 2 *l.* which before I did reserve, and they make 38: Therefore I put 38, under the Line in the place of pounds, and the whole Sum will be 38 *l.* 16 *s.*

Thus much are the 97 Gross worth, at 8 *s.* the Gross: the like is to be done of all other.

At 6 s. *the Yard,*
What 99 *Yards?*
3

29 *l.* 14 *s.*

As of 6 *s.* if you multiply by 3, likewise of 12 *s.* in multiplying by 6: also of 14, if you multiply by 7: And so of all even Numbers after the same manner.

At 12 s. *what* 345?
6

207 *l.* 0 *s.*

At 14 s. *what* 210?
7

147 *l.*

For 1 *s.* you must take the ½ of the $\frac{1}{10}$ part of any Number that is to be multiplied; and if any thing do remain they are Shillings: Thus shillings are converted into pounds; for it is but as though you divided them by 20 *s.* as by this Example doth appear.

I demand at 1 *s.* the Yard, the Piece or any other thing, what are 350 Yards or Pieces worth?

At 1 *shilling,*
What 350?

35|0 17 *l.* 10 *s.*

First, I separate the last Figure of 350 next to my right hand, which is the 0, with a Line between it and the Figure 5: then I make a Line under the 35|0, and I take the ½ of 35, after this manner; saying the half of 3 is 1, and 1 remaineth, which remain signifieth 10, in that second place, then

then I put 1 under the Line against 3, and I proceed to the rest, saying the half of 15 s. is 7, (which 15 came of the 1 that remained, and of the 5 in the 1 place) I put 7 under the Line, right against 5, and they make 17 l. The 1 which did last remain is 10 s. now I put 10 s. apart under the Line, and the whole Sum is 17 l. 10 s. so much are 350 worth at 1 s. the piece.

But when the Number of Shillings is not some aliquot part of 20 s. you must then convert the same Number of shillings, into the aliquot parts of 20, and make two or three Products as need shall require, which must be added together after this manner following. 5 Rule.

For 3 Shillings you must first take for 2 s. the $\frac{1}{10}$ of the Number that is to be multiplied, then for 1 s. you must take the $\frac{1}{2}$ of the Product which came of the same $\frac{1}{10}$ part: and add these two Sums together, as appeareth by this Example following.

At 3 s. the Piece of any thing, what shall 684 Pieces cost me after that rate? First, for 2 shillings I take the $\frac{1}{10}$ of 684, which is 68, in separating the last Figure 4, which I must double, and they be 8: I set 8 s. apart from the place of pounds, and then I have 68 l. 8 s. for the $\frac{1}{10}$ part, that is to say, for the 2 s. Secondly, for 1 s. I take the $\frac{1}{2}$ of the Product, that is to say, of 68 l. 8 s. which is 34 l. 4 s. and I put the same under the 68 l. 8 s. Then

At 3 shillings,	
What	684 ?
68 l.	8 s.
34 l.	4 s.
102 l.	12 l.

finally, I add those two Sums together, that is to say 68 *l.* 8 *s.* and 34 *l.* 4 *s.* so they make 102 *l.* 12 *s.* and so much are the 684 Pieces worth at 3 *s.* the Piece, as may appear in the preceding Margin.

For 6 *s.* take $\frac{1}{10}$ of the Number which is to be multiplied: that is to say, take $\frac{1}{10}$ then double the Product of the same $\frac{1}{10}$ and add them together. Or otherwise, for 4 *s.* take first the $\frac{1}{5}$ of the Number that is to be multiplied, then for 2 *s.* take $\frac{1}{2}$ of the Product, and add them together. Or else take for 5 *s.* the $\frac{1}{4}$ of the whole Sum, then for 1 *s.* take the $\frac{1}{5}$ of the Product, and add them together.

At 6 s. *what* 67?		
$\frac{1}{5}$ of 67	13 *l.*	8 *s.*
$\frac{1}{2}$ of that	6	14
In all	20	2

Likewise for 7 *s.* take first for 5 *s.* the $\frac{1}{4}$, then for 2 *s.* take the $\frac{1}{10}$ of the Number which is to be multiplied, and add them together.

At 7 s. *what* 347?		
$\frac{1}{4}$ of 347	86 *l.*	15 *s.*
$\frac{1}{10}$ of 347	34	14
	121	9

For 8 *s.* take the $\frac{1}{5}$ at two sundry times, that is to say, first, $\frac{1}{5}$ for 4 *s.* and then as much more for the other 4 *s.* and add them together.

At 8 s. *what* 540?	
$\frac{1}{5}$ of 540 is	108 *l.*
$\frac{1}{5}$ again is	108
	216

For 9 *s.* take first the $\frac{1}{4}$, and likewise the $\frac{1}{5}$ of the Number that is to be multiplied, and add them together.

At 9 *s.* *what* 230?		
$\frac{1}{4}$ of 230 is	57 *l.*	10 *l.*
$\frac{1}{5}$ is	46	0
	103	10

For

For 11 *s.* take first the $\frac{1}{2}$ for 10 *s.* Then for 1 *s.* take the $\frac{1}{10}$ of the Product, and add them together, or else for 5 *s.* take the $\frac{1}{4}$: then for 4 *s.* take the $\frac{1}{5}$, and lastly, for 2 *s.* take the $\frac{1}{2}$ of the last Product, and add them together.

At 11 s. what 159?		
$\frac{1}{2}$ of 159 is	79 *l.*	10 *s.*
$\frac{1}{10}$ of the $\frac{1}{2}$	7	19
	87	9

For 12 *s.* take first the $\frac{1}{2}$ for 10 *s.* then for 2 *s.* take the $\frac{1}{5}$ of the Product, and add them together.

At 12 s. *what* 349?		
$\frac{1}{2}$ of 349	174 *l.*	10 *s.*
$\frac{1}{10}$ is	34	18
	209	8

For 13 *s.* take the $\frac{1}{4}$, then the $\frac{1}{5}$, and again another $\frac{1}{5}$ of the Number which is to be multiplied, and add the Products together, that is to say, first for 5 *s.* take the $\frac{1}{4}$, then for 4 *s.* take the $\frac{1}{5}$, And again another $\frac{1}{5}$ for the other 4 *s.* and add the three Products together. The like is to be done in all others when the Price of the thing which is valued, is only of Shillings, as by these Examples following doth plainly appear.

At 13 s. what 267?		
$\frac{1}{4}$ of 267 is	66 *l.*	15 *s.*
$\frac{1}{5}$ is	53	8
$\frac{1}{5}$ more is	53	8
	173	11

Likewise in multiplying by pence, you shall have (at the first instant) pounds in the Product, in case you know the aliquot parts of $\frac{1}{10}$ of a pound, or of 24 *d.* which are these, 12, 8, 6, 4, 3, and 2. For 12 is the $\frac{1}{2}$ of 24, 8 is the $\frac{1}{3}$, 6 is the $\frac{1}{4}$, 4 is the $\frac{1}{6}$, 3 is the $\frac{1}{8}$, and 2 is the $\frac{1}{12}$: but for 12 *d.* which is 1 *s.* I have before made mention thereof. 6 Rule.

For 8 *d.* you must take the $\frac{1}{3}$ of the $\frac{1}{10}$, and the rest which are the pieces of 8 *d.* must be doubled

At 8 d. *the Ell,*
What 596 *Ells ?*

59|6		*l.*	*s.*	*d.*
3		19	17	4

At 6 d. *the Pound,*
What 678 *Pounds?*

67|8		*l.*	*s.*
4		16	19

At 4 d. *the Pound,*
What 934 *Pounds ?*

93|4		*l.*	*s.*	*d.*
6		15	11	4

At 3 d. *the Pound,*
What 571 *Pounds ?*

57|1		*l.*	*s.*	*d.*
8		7	2	9

At 2 d. *the Pound,*
What 364 *Pounds ?*

36|4		*l.*	*s.*	*d.*
12		3	0	8

At 1 d. *the Pound,*
What 676 *Pounds?*

4 *s.*		*l.*	*s.*	*d.*
676 (56 $\frac{1}{3}$ *or*		2	16	4
222				
2				

doubled to make of them pieces of 4 *d.* and of the same Number being doubled, you must take the $\frac{1}{3}$ which will be shillings, and if there do yet remain any thing, they are thirds of a shilling, being in value 4*d.* apiece.

For 6 *d.* take the $\frac{1}{4}$ of the $\frac{1}{10}$, and of what remaineth, you must take $\frac{1}{2}$ which shall be shillings, if there yet remain 1, it shall be in value 6 *d.*

For 4 *d.* take $\frac{1}{6}$ of the $\frac{1}{10}$, and of what resteth take $\frac{2}{3}$ to make thereof shillings, if any thing yet remain, they are thirds of a shilling, being in value 4 *d.* apiece.

For 3 *d.* take $\frac{1}{8}$ of the $\frac{1}{10}$, and of what resteth, take $\frac{1}{4}$ to make thereof shillings, if any thing yet remain, they are fourths of a shilling, every one of them being worth 3 *d.*

For 2 *d.* take $\frac{1}{12}$ of the $\frac{1}{10}$, and of what resteth, take $\frac{1}{6}$ which are shillings, if there remain any thing they shall be sixt parts of a shilling, every one being in value 2 *d.*

For 1 *d.* you shall understand that it is not possible with ease to bring pounds into the Product upon the total Sum; But first, you must bring them into Shillings by the order of the second Rule of this Chapter, and then afterward you shall convert them into pounds, if need require, as by these Examples following may appear.

But if the Number of pence, be not an aliquot part of 24 *d.* then must you bring them into the aliquot parts of 24, and make thereof divers Products, which must be added together, as shall hereafter appear. 7 Rule.

For 5 *d.* you shall first take for 3 *d.* then for 2 *d.* and add them together, according to the instruction of the last Rule. Or else, first take for 4 *d.* and then for 1 *d.*

At 5 d. *what* 927 ?		l.	s.	d.
92|7	$\frac{1}{8}$ *or* 3 d. *is*	11	11	9
8	$\frac{1}{2}$ *or* 2 d. *is*	7	14	6
		19	6	3

At 7 d. *what* 512 ?				
51|2	$\frac{1}{6}$ *or* 4 d. *is*	8	10	8
6	$\frac{1}{8}$ *or* 3 d. *is*	6	8	0
		14	18	8

For 7 *d.* first take for 4 *d.* then for 3 *d.* and add them together.

At 9 d. *what* 546 ?				
54|6	$\frac{1}{4}$ *or* 6 d. *is*	13	13	0
4	$\frac{1}{2}$ *or* 3 d. *is*	6	16	6
		20	9	6

For 9 *d.* take first for 6 *d.* then for 3 *d.* and add them together.

At 10 d. *what* 273 ?				
	$\frac{1}{4}$ *or* 6 d.	6	16	6
	$\frac{1}{6}$ *or* 4 d.	4	11	0
		11	7	6

For 10 *d.* first take for 6 *d.* then for 4 *d.* and add them together.

At 11 d. *what* 264 ?				
26|4	$\frac{1}{3}$ *or* 8 d. *is*	8	16	0
3	$\frac{1}{8}$ *or* 3 d. *is*	3	6	0
		12	2	0

For 11 *d.* take first for 8 *d.* then for 3 *d.* and add them together: As by the Examples in the Margin doth appear.

8 Rule. If you will multiply any Number by ſhillings and pence being both together, you muſt take firſt for the ſhillings, according to the inſtruction of the third Rule of this firſt Chapter, then take for the pence after the order of the fifth Rule before-mentioned: but if there be any aliquot parts of 1 *l.* containing both ſhillings and pence, then for thoſe parts you ſhall take ſuch like part of the Number that is to be multiplied as the Number is part of 1 *l.* which aliquot parts are theſe,

s.	*d.*			
6	8	*is the*	$\frac{1}{3}$	*of a pound or* 20 *s.*
3	4	*is the*	$\frac{1}{6}$	
2	6	*is the*	$\frac{1}{8}$	
1	8	*is the*	$\frac{1}{12}$	

At 6*s.* 8d. *what* 647?

x2	*l.*	*s.*	*d.*
647	(215	13	4
333			

And therefore for 6 *s.* 8*d.* you muſt take the $\frac{1}{3}$ of the Number that is to be multiplied: and if any thing remain they are thirds of a pound, every one being worth 6 *s.* 8 *d.*

At 3 s. 4 d. *what* 220?

	l.	*s.*	*d.*
220	(36	13	4
6			

For 3 *s.* 4 *d.* you muſt take the $\frac{1}{6}$ of the Number which is to be multiplied, and if any thing do remain they are ſixth parts of a Pound, every one being in value 3 *s.* 4 *d.*

At 2 s. 6 d. *what* 47?

	l.	*s.*	*d.*
47	(5	17	6
8			

For 2 *s.* 6 *d.* you muſt take the $\frac{1}{8}$, if any thing be remaining they are eighth parts of a pound, each one being worth 2 *s.* 6 *d.*

For

For 1 *s.* 8 *d.* you shall take the $\frac{1}{12}$ of the Number that is to be multiplied, and if there do any thing remain, they are twelfth parts of a pound, every one being in value 1 *s.* 8 *d.*

At 1 s. 8 d. *what* 400?

	l.	*s.*	*d.*
400	(33	6	8
12			

Here shall you accustome your self to multiply by all sorts of Sums, being composed of Shillings, and pence, which may come in use or practice. As thus, for 1 *s.* 1 *d.* for 1 *s.* 2 *d.* 1 *s.* 3 *d.* or 1 *s.* 4 *d.* Likewise, for 2 *s.* 1 *d.* 2 *s.* 2 *d.* 2 *s.* 3 *d.* 2 *s.* 4 *d.* and so of all other, considering moreover, many subtile Abbreviations, which happen oftentimes, that are easie to be conceived. 9 Rule.

As thus 11 *s.* 3 *d.* after that I have taken first the $\frac{1}{2}$ for 10 *s.* Then for 1 *s.* 3 *d.* I take the $\frac{1}{8}$ of the Product, because 1 *s.* 3 *d.* is the $\frac{1}{8}$ of 10 *s.* and by this means, when you have taken one Product, you may oftentimes upon the same take another more briefly, than upon the Sum that is to be multiplied, which thing you must foresee.

At 11 s. 3 d. *What* 53?

$\frac{1}{2}$ for 10 *s.*	26	10	0
$\frac{1}{8}$ of the Product	3	6	3
	29	16	3

At 6 s. 3 d. *What* 58?

58 ($\frac{1}{4}$ or 5 *s.*	14	10	0
4 $\frac{1}{16}$ or 1 3	3	12	6
	18	2	6

At

At 12 s. 8 d. *What* 64?

$\frac{1}{2}$ 10 *s.*	32 *l.*	0 *s.*	0 *d.*
$\frac{1}{10}$ 2 *s.*	6	8	0
$\frac{1}{3}$ of $\frac{1}{10}$.	2	2	8
	40	10	8

10 Rule. But if you will multiply by pounds, ſhillings, and pence, being all together; firſt, you muſt wholly multiply by pounds, then take for the ſhillings and pence, as in the ſixth Rule of this Chapter is plainly declared, and as by Examples following may appear.

At 3 l. 6 s. 8 d. *What* 49?

Multiply by 3 *l.*	147 *l.*	0 *s.*	0 *d.*
Divide by $\frac{1}{3}$ for 6 *s.* 8 *d.*	16	6	8
	163	6	8

At 5 l. 18 s. 4 *d.* *What* 543?

Multiply by 5 *l.*	2715	0	0
Divide by $\frac{1}{2}$ for 10 *s.*	271	10	0
by $\frac{1}{4}$ for 5 *s.*	135	15	0
by $\frac{1}{6}$ for 3 *s.* 4 *d.*	90	10	0
	3212	15	0

At 2 l. 7 s. 4 d. *What* 927?

Multiply by 2 *l.*	1854	0	0
Divide by $\frac{1}{5}$ for 4 *s.*	185	8	0
by $\frac{1}{6}$ for 3 *s.* 4 *d.*	154	10	0
	2193	18	0

So

So these Rules serve both to buy and sell. 11 Rule.
As at such a price the Ell, the Yard, the Piece, the Pound weight, or any other thing: how much is such a thing, or so many Ells worth? Likewise they are very necessary to convert all pieces of Gold and Silver into pounds: for I may as well say at 4 *s.* 8 *d.* the *French* Crown, what are 135 Crowns worth, as to say, at 4 *s.* 8 *d.* the Yard of Cloth, what are 135 Yards worth?

When any one of the Sums which is to be 12 Rule.
multiplied, is composed of many Denominations, and the other being of one Figure alone; then shall you multiply all the Denominations of the other Sum by the same one Figure, beginning first with that Sum, which is least in value towards your right hand, and bring the Product of those pence into shillings, and the Product of the shillings into Pounds, as by this Example doth appear.

At 3 l. 9 s. 8 d. *the Piece.*
What 7 ?

24 l. 7 s. 8 *d.*

But if any of the Numbers which are to be 13 Rule.
multiplied have with it a broken Number, you must (according to his Denominator) take one or many parts of the other Number, as need doth require, and set the Number, which cometh thereof under the Products, adding the same together. As thus, At 5 *l.* 7 *s.* 8 *d.* the Gross, what shall 34 Gross $\frac{1}{2}$ cost?

First, You shall multiply 5 *l.* 7 *s.* 8 *d.* by 34 Gross, saying, 5 times 34 do make 170 *l.*

Then

Then for 7 *s.* 8 *d.* take the ⅓ of 34 *l.* which is 11 *l.* 6 *s.* 8 *d.* Thirdly, for 1 *s.* take 34 *s.* which is 1 *l.* 14 *s.* Finally, for the ½ Groſs, you muſt take ½ of the 5 *l.* 7 *s.* 8 *d.* which is 2 *l.* 13 *s.* 10 *d.* And then add your four Products together, ſo you ſhall find that the 34 Groſs ½ at 5 *l.* 7 *s.* 8 *d.* the Groſs, is worth 185 *l.* 14 *s.* 6 *d.* as appears in this Example.

Rule, 14.

And as in the laſt Example you did, for the ½ Groſs, take half of the price (that one Groſs was worth) and therefore becauſe one Groſs is worth 5 *l.* 7 *s.* 8 *d.* the ½ Groſs muſt be worth half ſo much. So likewiſe if you have ⅓ of a Groſs, or of any other thing, you muſt take the ⅓ of the Price that one Groſs is worth. And in like manner for the ¼ of any thing, you ſhall take the ¼ of the Price. Alſo if you have the ⅕, take the ⅕ of the price that one is worth, and ſo of all other Fractions, as by the Examples in the Margin appeareth.

At 5 l. 7 s. 8 d. *What* 34 ½ ?

170 *l.*	0 *s.*	0 *d.*
11	6	8
1	14	0
2	13	10
185	14	6

At 4 l. 6 s. 8 d. *What* 46 ½ ?

184	0	0
15	6	8
2	3	4
201	10	0

At 8 l. 0 *s.* 9 *d.* *What* 54 ⅓ ?

432	0	0
1	7	0
0	13	6
2	13	7
436	14	1

At 3 l. 16 *s.* 8 d. *What* 17 ¼ ?

51	0	0
8	10	0
5	13	4
1	18	4
0	19	2
68	0	10

If

If you will make the proof of these Rules aforesaid, you must first abate the Sum of Money (which the Fraction of the Multiplication doth import) from the total Sum; and divide the rest of the pounds of the said total Sum, by the whole Multiplicand, the Fraction only excepted, and if any thing do remain after the Division is made, that remain shall be multiplied by 20, and unto the Product of that Multiplication, you shall add the shillings which remained of the rest of the total Sum; again, if any thing remain after the same Division, you must multiply the same by 12, and unto the Product, add the pence of the total Sum that remained, if any be left. And thus if ye have truly wrought, you shall find again the higher Sum of your Question, that is to say, the price that one Gross or any other thing is worth, whereof the Question is demanded. 15 Rule.

Or otherwise reduce the remain of the total Sum (the value of the money that the Fraction is worth being first reduced) all into pence, in multiplying the pounds by 20, and the shillings by 12, and adding thereunto the shillings and pence, which are joined with the remain of the said total Sum if any such be, then divide those pence by the aforesaid Number that is to be multiplied, the Fractions of the same Number being also abated. So shall you find the Price that one Piece, one Gross, or any other thing is valued at; as in the first of the three last Examples going before, where the total Sum is 201 *l.* 10 *s.* from which I do rebate the Price of the half Gross,

which is 2 *l.* 3 *s.* 4 *d.* the rest is 199 *l.* 6 *s.* 8 *d.* which being reduced into pence, bringeth 47840 *d.* I divide the same by 46, and thereof cometh 1040 *d.* Then I divide that 1040 *d.* by 12, and they bring 86 *s.* 8 *d.* that is to say, 4 *l.* 6 *s.* 8 *d.* which is the price that one Gross, or any other thing did cost, as in that first Example doth appear.

The like is to be done of any manner of thing that is sold by the Hundred, after 5 score to the Hundred.

16 Rule. As thus, at 12 *l.* 7 *s.* 6 *d.* the Hundred pounds Weight, what shall 374 pound weight cost? You shall first multiply 12 *l.* 7 *s.* 6 *d.* by 3, that is to say, by 3 hundred: then for 50 pound weight you shall take the $\frac{1}{2}$ of 12 *l.* 7 *s.* 6 *d.* because 50 *l.* is the $\frac{1}{2}$ of 100 *l.* Likewise for 20 pound weight, which is the $\frac{1}{5}$ of 100 *l.* you shall take the $\frac{1}{5}$ of 12 *l.* 7 *s.* 6 *d.* Lastly, for 4 pound weight you must take the $\frac{1}{5}$ of the last Product. This done, you must add all these Products into one Sum, which will make the Sum of 46 *l.* 5 *s.* 7 *d.* $\frac{4}{5}$, as by the Example above doth appear.

At	12 l.	7 s.	6 d.
What	374 ?		
	37 *l.*	2 *s.*	6 *d.*
	6	3	9
	2	9	6
	0	9	10 $\frac{4}{5}$
	46	5	7 $\frac{4}{5}$

The Proof is made by reducing the total Sum into pence, and to divide the Product by the Number that is to be multiplied, that is to say by 374, likewise divide the Quotient produced of that first Division by 12: so shall you find again the higher Sum 12 *l.* 7 *s.* 6 *d.*

which

which is the Price of 100 pound weight as before.

Also the like may be done of our usual weight here in *England*, (which is 112 *l.* for every 100 *l.* weight) in case you know the aliquot parts of 100, that is to say, 112 pound weight, which are these. 17 Rule.

56 *l.*	*is the half*	$\frac{1}{2}$	*of* 112 l.
28	*is the quarter*	$\frac{1}{4}$	
14	*is the half qu.*	$\frac{1}{8}$	
7	*is half thereof*	$\frac{1}{16}$	

Therefore for 56 *l.* take the $\frac{1}{2}$ of the Sum of money that the 112 pound weight is worth.

For 28 *l.* take the $\frac{1}{4}$ of the Sum of money that 112 *l.* is worth.

For 14 *l.* take the $\frac{1}{8}$ of the Sum that the Hundred is worth.

For 7 *l.* take the $\frac{1}{16}$ of the Sum of money that the Hundred is worth.

As thus, at 3 *l.* 6 *s.* 8 *d.* the 100 pound weight, that is to say, the 112 *l.* what shall 24 hundred, 3 quarters, 21 pound weight cost after the rate?

First, you shall multiply 24 hundred by 3, which is the 3 *l.* and thereof will come 72 *l.* then for 6 *s.* 8 *d.* which is the $\frac{1}{3}$ of 20 *s.* you shall take the $\frac{1}{3}$ of 24, which is 8 *l.* for 24 Nobles, maketh 8 *l.* afterward; for the 3 quarters of the Hundred you shall first for the 56 *l.* take the $\frac{1}{2}$ of 3 *l.* 6 *s.* 8 *d.* because 56 *l.* is the $\frac{1}{2}$ of the Hundred, and thereof cometh 1 *l.* 13 *s.* 4 *d.* then for 28 *l.* (which is the quarter of an Hun-

Hundred) you shall take the $\frac{1}{2}$ of 3 *l.* 6 *s.* 8 *d.* or else the $\frac{1}{2}$ of the Product, which cometh last of 56*l.* which is 16 *s.* 8 *d.* likewise for 14*l.* you must take the $\frac{1}{8}$ of 3 *l.* 6 *s.* 8 *d.* which is 8 *s.* 4 *d.* or else the $\frac{1}{2}$ of the Product that cometh of 28*l.*	*At* 3 l.	6 s.	8 d.
	What 24 C.	3 q.	21 l.
	72 *l.*	0 *s.*	0 *d.*
	8	0	0
	1	13	4
		16	8
		8	4
		4	2
	83	2	6

which is all one. Finally, for 7 *l.* take the $\frac{1}{16}$ of 3 *l.* 6 *s.* 8 *d.* or else the $\frac{1}{2}$ of the last Product that cometh of 14 *l.* and thereof cometh 4 *s.* 2 *d.* Then add all these Products together, and the total Sum will be 83 *l.* 2 *s.* 6 *d.* so much are the 24 Hundred, 3 quarters, and 21 pound weight worth after 3 *l.* 6 *s.* 8 *d.* the Hundred as appeareth in the Margin.

The Proof hereof is made like the other Proofs aforesaid, saving, that where in those Proofs you abate the Price of the Money, that the Fraction was worth, from the total Sum; here in this Example (and in such other like) you must abate the Price of the Money, that the odd weight amounteth unto (over and above the just Hundreds) from the total Sum; the rest thereof shall you convert into pence, dividing the Product of the Multiplication by the just Number of the Hundreds, so shall you find the pence, that one Hundred is worth: which you shall bring into pounds by the order of Division, and so of all other.

CHAP.

CHAP. II.

Of Questions of the Trade of Merchandize, in which is taught the Rule of Three in Fractions.

THE Rule of Three in Fractions, may be either direct or indirect, as well as in whole Numbers.

You must also take notice, before you can work your Question, whether your three Numbers be all Fractions or not: for if any of them be either mixt Numbers or whole Numbers, they must be brought into Fractions, and so wrought according to these three Rules and Examples.

First, if the three given Numbers are all Fractions, you must multiply the Numerators of the second and third Fractions in your Rule of Three, the one by the other, and again you must multiply that Product, by the Denominator of the first Fraction: and the Number which cometh of this last Multiplication, shall be your Dividend, or Number that must be divided.

Secondly, You must multiply likewise the Denominators of the second and third Fractions in your said Rule of Three, the one by

the other, and the Product again by the Numerator of the first Fraction, and the Number, which is produced of that Multiplication, shall be your Divisor.

Thirdly, You must divide the aforesaid Dividend by the Divisor, and the Quotient will be the Answer to the Question, as by Examples shall hereafter appear.

But if you find whole Numbers and Fractions together, in the said Rule of Three; you must first reduce the same into their Fractions by the sixth Reduction.

Likewise if you find any of the three Numbers in your Rule of Three, to be whole Numbers, alone without any Fraction joyned with it, you must in this case put 1 under the same whole Number with a Line between them both; which 1 doth represent the Denominator to the same whole Number; and then you must proceed to work the Rule of Three in like manner, as though they were all Fractions, as before is said.

The Examples of all three Differences aforesaid do follow in the three next Questions orderly.

If $\frac{2}{3}$ X $\frac{4}{5}$ $\frac{7}{8}$: I understand thereby thus as followeth: If $\frac{2}{3}$ of any Weight, or Measure be worth $\frac{4}{5}$ of 20 *s.* or of any other Sum, what are $\frac{7}{8}$ of the like Weight or Measure worth after the rate?

Answ. First, as is said before, I do multiply the Numerators of the second and third Fractions, the one by the other, that is to say, 7 by

by 4, and they make 28: again, I multiply the said 28 by the Denominator of the first Fraction, that is to say, by 3, and thereof cometh 84, which 84 I set over the Cross for my Dividend.

Secondly, I multiply the Denominators of the second and third Fractions, the one by the other, namely, 8 by 5, and they make 40; again, I multiply the said 40 by the Numerator of the first Fraction, that is to say, by 2, and thereof cometh 80, the same 80 I set under the Cross for my Divisor.

Then I divide 84 by 80, and there cometh in the Quotient 1 *l.* and $\frac{4}{80}$ remaining, which $\frac{4}{80}$ being abbreviated maketh $\frac{1}{20}$ of a pound, which is worth 12 *d.* And so much will the aforesaid $\frac{7}{8}$ cost, as by the work following doth appear.

$$\begin{array}{c} 84 \\ \frac{2}{3}\ \mathsf{X}\ \frac{4}{5} \quad \frac{7}{8} \\ 80 \end{array} \qquad \begin{array}{r} 7 \\ 4 \\ \hline 28 \\ 3 \\ \hline 84 \end{array} \qquad \begin{array}{r} 8 \\ 5 \\ \hline 40 \\ 2 \\ \hline 80 \end{array} \qquad \begin{array}{l} 84\,(1\,\frac{4}{80} \\ 80 \end{array}$$

If this were reduced into Decimals, the work would be performed just as in whole Numbers, though this way it seems little like it.

$$\begin{array}{cccc} \frac{2}{3} & \frac{4}{5} & \frac{7}{8} & \\ 0,667 & 0,800 \ : & 0,875 & 1,050 \\ & & 800 & \\ \hline & & 700000 & \end{array}$$

33
700000(1,050 fere, *which is* 1 l. 1 s.
66777
888
6

Example of the second Sort.

If $\frac{4}{5}$ of an Ell of any Merchandize do cost me 12 *s.* 7 *d.* which 7 *d.* doth make $\frac{7}{12}$, what will $\frac{2}{10}$ of an Ell cost me after the same rate?

Answ. First I set down my Numbers, as followeth.

If $\frac{4}{5}$ X 12 $\frac{7}{12}$, $\frac{2}{10}$. Then by the sixth Reduction, I reduce 12 $\frac{7}{12}$ all into twelfths, and they make $\frac{151}{12}$ for the second Number in my Rule of Three, which must stand in the place of 12 $\frac{7}{12}$, And then will my three Numbers stand thus,

$$\begin{array}{r} 12 \\ 12 \\ \hline 144 \\ add \quad 7 \\ \hline 151 \end{array}$$

$$\frac{4}{5} \overset{6795}{\underset{240}{\mathrm{X}}} \frac{151}{12} \qquad \frac{2}{10}$$

Then I multiply 151 by 9, and the Product by 5, and thereof cometh 6795, which I set over the Cross, for my Dividend.

$$\begin{array}{r} 151 \\ 9 \\ \hline 1359 \\ 5 \\ \hline 6795 \end{array}$$

Like-

Likewise I multiply 12 by 10, and the Product by 2, and thereof cometh 240, which I set under the Cross for my Divisor.

12
10
120
2
240

Then I divide 6795 by 240, and thereof cometh in the Quotient 28 *s.* and 75 remaining.

$\frac{1}{2}$	3
	297
	6795 (28
	2440

Which 75, because it is the remain of shillings, I multiply it by 12 *d.* for that there are 12 pence in a shilling, and thereof cometh 900.

75
12
150
75
900

The same 900 I divide again by 240, and thereof cometh 3 *d.* and 180 remaining, which 180 I set apart over 240, with a Line between them both, and they are $\frac{180}{240}$, which being abbreviated do make $\frac{3}{4}$ of a peny; and thus I find that the $1\frac{2}{5}$ of an Ell shall cost 28 *s.* 3 *d.* $\frac{3}{4}$, as appeareth.

18 *d.*
900 (3 $\frac{180}{240}$ or $\frac{3}{4}$
240

In Decimals, $\frac{2}{5}$ 12 *s.* 7 *d.* $\frac{2}{12}$

.4 .151 *d.* 28

.9

.1359

123

12358 (339 *q.* $\frac{1}{4}$ which reduced is 28 *s.* 3 *d.* 3 *q.*

444

Example of the third Sort.

If $\frac{1}{3}$ of an Ell do cost me 8 *s.* what will 7 Ells $\frac{1}{2}$ cost me after the rate?

Answ. I first reduce the whole Number and broken into his broken, by the sixth Reduction, that is to say, 7 $\frac{1}{2}$ into halfs, and they are $\frac{15}{2}$, which must be the third Number in my Rule of three, the second Number is 8 *s.* but I must (as before is taught) put 1 under 8 with a Line between them, to make it like a Fraction thus, $\frac{8}{1}$.

	7
	2
	—
$7\frac{1}{2}$	14
	1
	—
	15

Then must my three Numbers in my Rule of three stand after this manner.

$$\begin{array}{ccc} & 600 & \\ \frac{1}{3} & \times\ \frac{8}{1} & \frac{15}{2} \\ & 6 & \end{array}$$

Then I multiply 15 by 8, and the Product thereof by 5, and it amounteth to 600, which I set over the Cross for my Dividend.

Likewise I multiply 2 by 1, and the Product thereof by 3, and thereof cometh 6, which I set under the Cross for my Divisor.

15	2
8	1
—	—
120	2
5	3
—	—
600	6

Then I divide 600 by 6, and I find in my Quotient 100, which is 100 *s.* I do therefore divide 100 by 20 *s.* and my Quotient is 5 *l.* And

600 (100 *s.*
666

100 (5 *l.*
20

6

so much will the 7 Ells $\frac{1}{2}$ cost me, as in the foregoing Margin appeareth.

In Decimals,	$\frac{3}{5}$	8 *s.*	7 $\frac{1}{2}$
	0,6	8,	7,5
			8
600 (100 *s.*			——
666			600

If one Ell cost me 17 *s.* what shall 15 Ells $\frac{1}{8}$ part cost? which $\frac{1}{8}$ is half a quarter of an Ell.

Answ. Say, If $\frac{1}{1}$ X $\frac{17}{1}$ 15 $\frac{1}{8}$, first reduce 15 $\frac{1}{8}$ into eighth parts, and they make $\frac{121}{8}$; then multiply 121 by 17, once, and thereof cometh 2057 for your Dividend. Likewise multiply 8 times 1, twice, and the Product will be 8, for your Divisor, then divide 2057 by 8, and you shall find 257 *s.* $\frac{1}{8}$, which is 12 *l.* 17 *s.* 1 *d.* $\frac{1}{2}$, and so much are the 15 Ells $\frac{1}{8}$ worth, as by Practice appeareth in the Example in the Margin.

	2057		
$\frac{1}{1}$	X	$\frac{17}{1}$	15 $\frac{1}{8}$
	6		

Or otherwise for 10 *s.* take the $\frac{1}{2}$ of 15 *l.* which is 7 *l.* 10 *s.* then for 5 *s.* take the half of 7 *l.* 10 *s.* which is 3 *l.* 15 *s.* thirdly for 2 *s.* take the $\frac{1}{5}$ of 7 *l.* 10 *s.* because the $\frac{1}{5}$ of 10 *s.* is 2 *s.* fourthly for the $\frac{1}{8}$ of the Ell, you shall take the $\frac{1}{8}$ of 17 *s.* which is 2 *s.* 1 *d.* $\frac{1}{2}$; Then add all these Sums together, and you shall find 12 *l.* 17 *s.* 1 *d.* $\frac{1}{4}$, and as appeareth more plainly in the former Practice.

15 $\frac{1}{8}$		
17		
7	10	0
3	15	0
1	10	0
	2	1 $\frac{1}{2}$
12	17	1 $\frac{1}{2}$

If 25 Ells be worth 2 *l.* 3 *s.* 4 *d.* what are 18 Ells $\frac{3}{4}$ worth by the price?

Answ. First, put 3 *s.* 4 *d.* into the part of a pound, and you shall have $\frac{1}{6}$; then say, if $\frac{25}{1}$ give me 2 *l.* $\frac{1}{6}$, what shall 18 $\frac{3}{4}$ give? Put the whole Numbers 6 into their broken, and the Question will stand thus,

$$\begin{array}{ccc} & 975 & \\ \frac{25}{1} & \times & \frac{13}{6} \quad \frac{75}{4} \\ & 600 & \end{array}$$

Then multiply once 13 by 75, the Product will be 975, which you shall divide by 25 times 6, 4 times, which maketh 600, then divide 975 by 600, and your Quotient will be 1 *l.* and 375 will remain, which 375 you shall multiply by 20, and thereof will come 7500, divide the same by 600, your Quotient will be 12 *s.* and 300 will remain, which abbreviated is $\frac{1}{2}$, which is 6 *d.* thus the 18 Ells $\frac{3}{4}$ are worth 1 *l.* 12 *s.* 6 *d.* as by Practice will appear.

Or otherwise by the Rules of Practice, because that 12 Ells $\frac{1}{2}$ is the half of 25 Ells, therefore take the half of 2 *l.* 3 *s.* 4 *d.* which is 1 *l.* 1 *s.* 8 *d.* then for 6 Ells $\frac{1}{4}$ take the $\frac{1}{4}$ of 2 *l.* 3 *s.* 4 *d.* or else the half of the last Product, (that is to say, of 1 *l.* 1 *s.* 8 *d.*) which is all one, and add them together, so shall you have 1 *l.* 12 *s.* 6 *d.* as before.

	l.	*s.*	*d.*
	2	3	4
$\frac{1}{2}$	1	1	8
$\frac{1}{4}$		10	10
	1	12	6

CHAP.

CHAP. III.

Of Losses and Gains in the Trade of Merchandize.

1 IF 13 Yards $\frac{1}{3}$ be worth 22 *l.* 10 *s.* how much shall I sell 1 Yard to gain $\frac{1}{3}$ or to make 3, 4, which is all one.

Answ. Say by the Rule of Three, if 3 do yield 4, what will 22 $\frac{1}{2}$ yield? Multiply and divide, and you shall find 30 *l.* Then say again by the Rule of Three, if 13 Yards $\frac{1}{3}$ do give 30 *l.* as well of Principal, as of Gain, what will 1 Yard be worth by the Price? Multiply and divide, and you shall find 2 *l.* 5 *s.* and for that price must the Yard be sold, to gain the $\frac{1}{3}$, or to make of 3, 4.

180

$\frac{3}{1}$ X $\frac{4}{1}$ 22 $\frac{1}{2}$ or $\frac{45}{2}$ 180 (30

6 66

1

90

13 $\frac{1}{3}$ or $\frac{40}{3}$ X $\frac{30}{1}$ 90 (2 $\frac{1}{4}$

40 40

In Decimals, 3 4 :: 22 *l.* 5 (30 *l.*

13, 333 30 :: 1 (2 *l.* 250

Or

Or otherwise, take the $\frac{1}{3}$ part of 22 *l.* 10 *s.* which is 7 *l.* 10 *s.* that shall you add with 22 *l.* 10 *s.* and you shall have 30 *l.* as before. Then divide 30 by 13 $\frac{1}{3}$ and you shall find 2 *l.* 5 *s.* as above is said.

22 *l.*	10 *s.*
7	10
30	0

2 If one Yard be worth 27 *s.* 6 *d.* for how much shall 16 Yards $\frac{2}{3}$ be sold, to gain 2 *s.* upon the pound of money, that is to say, upon 20 *s*?

Answ. Add 2 *s.* to 20, and you shall have 22, then say, if 20 *s.* principal do give 22 *s.* principal and gain; how much shall 27 *s.* 6 *d.* principal yield? Multiply and divide, and you shall find 30 *s.* $\frac{1}{4}$. Then say again by the Rule of Three, if one Yard do give me 30 *s.* $\frac{1}{4}$, (which is as well the principal as the gain) what shall 16 Yards $\frac{2}{3}$ give me? Multiply and divide, and you shall find 25 *l.* 4 *s.* 2 *d.* For the same price shall the 16 Yards $\frac{2}{3}$ be sold, to gain after the rate of 2 *s.* upon the pound of money, or upon 20 *s.* which is all one.

$$\overset{1210}{\underset{40}{\frac{22}{1}\ \mathsf{X}\ \frac{22}{1}}} \ :\ 27\tfrac{1}{2} \text{ or } \tfrac{55}{2}\ (30\tfrac{1}{4}$$

$$\overset{6050}{\underset{12}{4\ \mathsf{X}}}\ 30\tfrac{1}{4} \text{ or } \tfrac{121}{4} : 16\tfrac{2}{3} \text{ or } \tfrac{50}{3}\ (504s.\ \tfrac{2}{6}$$

which is 25 *l.* 4 *s.* 2 *d.*

In

l. *l.* *parts.*
In Decimals, 1; 1100 :: 1, 375 (1, 5125
yard *l.* *yards* *l.*
1 1, 5125 :: 16, 6666 (25, 2082

3 If 10 Yards $\frac{2}{3}$ be worth 25 *l.* 10 *s.* for how much shall 2 Yards $\frac{1}{4}$ be sold, to gain after 10 *l.* upon the 100 *l.* of Money?

Answ. Say, If 100 principal yield 110, as well principal as gain, how much will 25 *l.* 10 *s.* yield me? Multiply and divide and you shall find 28 *l.* 1 *s.* Then say, if 10 Yards $\frac{2}{3}$ do yield me 28 *l.* 1 *s.* as well principal as gain, how much shall 2 $\frac{1}{4}$ yield me? Multiply and divide, and you shall find 5 *l.* 18 *s.* 4 *d.* 1 $\frac{2}{3}$ and for so much shall the 2 Yards $\frac{1}{4}$ be sold, to gain after 10 *l.* upon the 100 *l.* of Money.

5610
$\frac{100}{1}$ X $\frac{110}{1}$ 25 $\frac{1}{2}$ (28 *l.* $\frac{1}{20}$
200

15147
10 $\frac{2}{3}$ X 28 $\frac{1}{20}$ 2 $\frac{1}{4}$ (5 *l.* $\frac{2347}{2560}$
2560

l. *l.* *l.* *l.*
In Decimals, 100 110 :: 25, 5 (28, 05
yards *l.* *yards* *l.*
10, 666 28, 05 :: 2, 25 (5, 9168, which is 5 *l.* 18 *s.* 4 *d.*

And

And although in these Questions of Gain and Loss, sometimes the first Number is not like unto the third Number, that is to say, of the same Denomination, for whereas one would say, if 20 *s.* gain 2 *s.* what shall 50 *l.* gain? or what shall 25 *l.* gain? *&c.* Or if 20 *l.* do gain 2 *l.* what shall 15 *s.* gain? or what shall 27 *s.* $\frac{1}{2}$ gain? yet the same doth not prove that the Rule is therefore false. For if 20 *s.* do gain 2 *s.* 20 *l.* shall gain 2 *l.* and 20 *d.* shall gain 2 *d.* likewise 20 Crowns shall gain 2 Crowns, and so of all others. Therefore it is to be understood, that the first Number of the Rule of Three in these reasons is purposed to be semblable, or like to the third in quality or name.

When one Merchant selleth Wares to another, and he giveth to the Buyer 2 upon 15; how much shall the Buyer gain upon the 100, after the rate?

Answ. First, add 2 unto 15, and they are 17, then say, if 15 give 17, what shall 100 give? Multiply and divide and you shall find $13\frac{1}{3}$; so the Buyer gets after the rate of $13\frac{1}{3}$ upon the 100.

15 | 17 : | 100 — $13\frac{1}{3}$

4 If one Northern Dozen cost me 3 *l.* 5 *s.* I sell the same again for 3 *l.* 12 *s.* 6 *d.* how much do I gain upon the pound of money after the rate?

Answ. Say, If 3 *l.* $\frac{1}{4}$ do give 3 *l.* $\frac{5}{8}$, what shall $\frac{20}{1}$ give? put the whole Numbers into their broken, and you shall have $\frac{13}{4}$ X $\frac{29}{8}$ $\frac{20}{1}$, then multiply 4 times 29 by 20, and thereof cometh 2320, for your Number that is to be divi-

divided: likewise multiply 13 times 8 once, and thereof cometh 104; then divide 2320 by 104, and you shall find 22 *s.* $\frac{4}{13}$: so I shall get 1 *s.* $\frac{4}{13}$ upon 20 *s.* or upon the pound of Money.

In Decimals,

3 *l.* 25 3 *l.* 625 :: 1 *l.* (1 *l.* 1154 *or* 1 *l.* 2 *s.* 3 *d.* 3 *q. fere.*

5 If a Yard of Cloth cost me 7 *s.* 8 *d.* and afterward I sell of the same Cloth 13 Yards $\frac{1}{4}$ for 4 *l.* 13 *s.* 4 *d.* I would know whether I do win or lose, and how much upon the 100 *l.* of Money?

Answ. See first at 7 *s.* 8 *d.* the Yard what the 13 Yards $\frac{1}{4}$ shall cost, and you shall find 5 *l.* 1 *s.* 7 *d.* and I sold the same but for 4 *l.* 13 *s.* 4 *d.* so that I lose upon the 13 Yards $\frac{1}{4}$ the Sum of 8 *s.* 3 *d.* Then if you will know how much is lost in the 100; Say by the Rule of three, if 5 *l.* 1 *s.* 7 *d.* do lose 8 *s.* 3 *d.* what will 100 *l.* lose? First, put 1 *s.* 7 *d.* into the part of a pound, and it will be $\frac{19}{240}$. Likewise put 8 *s.* 3 *d.* into the part of a pound, and it is $\frac{33}{80}$; then will your Numbers stand thus, 5 $\frac{19}{240}$ X $\frac{33}{80}$ $\frac{100}{1}$. Reduce the whole into his broken, so you have for the 5 $\frac{19}{240}$, $\frac{1219}{240}$, and then multiply and divide, so you shall find 8 *l.* $\frac{1164}{9752}$, which Fraction is worth 2 *s.* 5 *d.* $\frac{162}{1219}$, and so much is lost in the 100 pounds of Money.

$\frac{1219}{240}$ X $\frac{33}{80}$ $\frac{100}{1}$

In Decimals,

5,0792 0,4125 :: 100:0000 8,1211

6 *More,* If 12 Yards $\frac{1}{2}$ of Scarlet be sold for 30 *l.* 15 *s.* upon which is gained after the rate of 11 $\frac{1}{9}$ upon the 100; I demand what the Yard did cost at the first?

Answ. From 30 *l.* 15 *s.* subtract his $\frac{1}{10}$ part, which is 3 *l.* 1 *s.* 6 *d.* and there resteth 27 *l.* 13 *s.* 6 *d.* which Number multiplied by 2, bringeth 55 *l.* 7 *s.* of which Number take the $\frac{1}{5}$, which is 11 *l.* 1 *s.* 4 *d.* and $\frac{4}{5}$: then take again the $\frac{1}{5}$ of the said 11 *l.* 1 *s.* 4 *d.* $\frac{4}{5}$, which is 2 *l.* 4 *s.* 3 *d.* $\frac{2}{23}$, and so much did the Yard cost at the first peny.

30 *l.*	15 *s.*	0 *d.*
3	1	6
27	13	6
2	0	0
55	7	0
11	1	4 $\frac{4}{5}$
2	4	3 $\frac{2}{23}$

7 *More,* If 15 Yards $\frac{1}{4}$ of Scarlet do cost me 32 *l.* 13 *s.* 4 *d.* and I sell the Yard again for 2 *l.* Whether do I win or lose, and how much in or upon the pound of Money?

Answ. Look what the 15 Yards $\frac{1}{4}$ are worth at 2 *l.* the Yard, and you shall find that they are worth 31 *l.* 10 *s.* But they did cost 32 *l.* 13 *s.* 4 *d.* so that there is lost upon the whole 1 *l.* 3 *s.* 4 *d.* Then to know how much is lost in the pound, say by the Rule of Three, if 32 *l.* lose 1 *l.* $\frac{2}{3}$, what will $\frac{1}{1}$ or 1 *l.* lose? Reduce the whole Numbers into their broken, and then multiply and divide, so shall you find $\frac{21}{588}$ parts of a pound. Then multiply 21 by 240 *d.* because so many pence are in a pound, and divide the

the Product by 588, and you shall find 8 *d.* $\frac{336}{588}$, which being abbreviated, make $\frac{4}{7}$, and thus you see that 8 *d.* $\frac{4}{7}$ is lost in the pound of Money.

$$\frac{98}{32\frac{2}{3}} \times \frac{7}{1\frac{1}{6}}\ \frac{4}{\ }$$

8 If one Yard of Cloth of Tissue be sold for 3 *l.* 15 *s.* whereupon is lost after the rate of 10 *l.* in the 100: I demand what 12 Yards $\frac{1}{2}$ of the same Tissue did cost?

Answ. The Loss being after 10 in the 100, so that 100 *l.* yields but 90 *l.* Say, As 90 *l.* to 100 *l.* So 3 *l.* 15 *s.* to 4 *l.* 3 *s.* $\frac{1}{3}$, which was the price one Yard cost: Then 12 Yards $\frac{1}{2}$ at 4 *l.* 3 *s.* 4 *d.*

	l.	*s.*	*d.*
12 times 4 *l.* is	48	0	0
12 times 3 *s.* 4 *d.* is	2	0	0
The $\frac{1}{2}$ Yard is	2	1	8
In all	52	1	8

9 *More*, If I sell one *Wiltshire* White for 6 *l.* 12 *s.* whereupon I gain after the rate of 2 *s.* upon the pound of Money, that is to say, upon 20 *s.* I demand what 11 pieces of the same Whites did cost me?

Answ. From 6 *l.* 12 *s.* (which is 132 *s.*) you shall subtract his $\frac{1}{11}$ part, that is to say, 12 *s.* and there will remain 120 *s.* or 6 *l.* Then see at 6 *l.* the Cloth, what the 11 Cloths are worth, and you shall find that they are worth 66 *l.* And so much did the 11 Cloths cost.

10 If

	132 s.	
x		11
xyx (12	12	6
xxx		
x	120	66

10 If I sell 10 Ells ½ of Holland for 22 s. 6 d. whereupon I lose after the rate of 2 s. in the pound of money, I demand what the Ell did cost me?

Answ. Say by the Rule of Three, if 18 give 20 s. what will 22 s. 6 d. give? Multiply and divide, and you shall find 25 s. Then divide 25 s. by 10 ½, and thereof cometh 2 s. 4 d. $\frac{4}{7}$ So much did the Ell cost.

$\frac{21}{1}$ X $\frac{20}{1}$ 22 ½ 25

11 If I sell one Cloth for 5 l. whereupon I lose after 10 in the 100, I demand how much I shall lose or gain in the 100, if I sell the same for 5 l. 10 s.

Answ. Say, if 90 yield 100, how much will 5 l. give? Multiply and divide, and you shall find 5 l. $\frac{5}{9}$ Then say again by the Rule of Three, if 5 $\frac{5}{9}$ come to 5 ½, what will 100 come to? Multiply and divide, and you shall find 99 l. which being subtracted from 100, there will remain 1 l. and so much is lost in the 100.

CHAP.

CHAP. IV.

Of Lengths and Breadths of Tapestry, and other Clothes.

1 IF a Piece of Tapestry be 5 Ells $\frac{1}{4}$ long, and 4 Ells $\frac{2}{3}$ in breadth, how many Ells square doth the same Piece contain?

Answ. Multiply the length by the breadth, that is to say, $5\frac{1}{4}$ by $4\frac{2}{3}$, and thereof will come 26 Ells $\frac{5}{6}$, so many Ells square doth the same piece contain.

2 *More*, If a piece of Tapestry contain 32 Ells square, the same being in length 6 Ells $\frac{1}{4}$, I demand how many Ells in breadth the same Piece doth contain?

Answ. Divide 32 Ells by $6\frac{1}{4}$, and thereof cometh $5\frac{3}{25}$, so many Ells doth the same piece contain in breadth.

3 *More*, A Piece of Cloth being 13 Yards $\frac{1}{3}$ in length, and 5 quarters $\frac{1}{2}$ a quarter in breadth, how many Yards of $\frac{2}{3}$, and $\frac{1}{2}$ of one third broad, will the same piece make?

Answ. See first by the fifth Reduction what part of a Yard the $\frac{5}{4}$ and $\frac{1}{2}$ quarter be, and you shall find that they make $\frac{11}{8}$, which is one Yard $\frac{3}{8}$, then multiply 13 Yards $\frac{1}{3}$ by 1 Yard $\frac{3}{8}$, you shall have 18 Yards $\frac{1}{3}$ in square, which you must divide by $\frac{2}{3}$ and $\frac{1}{2}$, being reduced in-

to one Fraction by the fifth Reduction; that is to say, by $\frac{5}{6}$ (because the $\frac{2}{3}$ and $\frac{1}{2}$ being brought into one Fraction, maketh $\frac{5}{6}$) and you shall find 22 Yards; so many Yards of $\frac{2}{3}$ and $\frac{1}{2}$ broad doth the same piece contain.

4 *More*, A Merchant bought 4 Yards $\frac{2}{3}$ of Cloth, being six quarters and half one quarter broad, to make him a Gown, which he will line throughout with black Say of $\frac{3}{4}$ of a Yard broad: I demand how much Say he must buy.

Answ. Multiply the length of the Cloth by the breadth, that is to say, $4\frac{2}{3}$ by $1\frac{5}{8}$ (which is the 6 quarters $\frac{1}{2}$ a quarter) and thereof cometh 7 Yards $\frac{7}{12}$, which divide by $\frac{3}{4}$, and you shall find 10 Yards $\frac{1}{9}$; so many Yards of Say must he have to line the same 4 Yards $\frac{2}{3}$ of Cloth, being of 6 quarters, and $\frac{1}{2}$ a quarter broad.

5 *More*, At 6 *s.* 8 *d.* the Ell square, what shall a Piece of Tapestry cost me, which is 5 Ells $\frac{1}{2}$ long, and 4 Ells $\frac{1}{4}$ broad?

Answ. Multiply $5\frac{1}{2}$ by $4\frac{1}{4}$, and thereof cometh 23 Ells $\frac{3}{8}$ square, then say by the Rule of Three, If one Ell square cost me 6 *s.* 8 *d.* what shall 33 Ells $\frac{3}{8}$ cost? Multiply and divide, and you shall find 7 *l.* 15 *s.* 10 *d.* so much the said piece of Tapestry did cost.

Or otherwise by the Rules of Practice, take the $\frac{1}{3}$ of $23\frac{3}{8}$: and you shall find 7 *l.* 15 *s.* 10 *d.* as above is said.

6 *More*, A Piece of *Holland* Cloth containing 42 Ells $\frac{2}{3}$ *Flemish*, how many Ells *English* do they make?

Answ. Here you must first note, that 100 Ells *Flemish* make but 60 Ells *English*, and so con-

consequently 5 Ells *Flemish* make but 3 Ells *English*. Therefore say by the Rule of Three, if 5 Ells *Flemish* make 3 Ells *English*, how many *English* will 42 Ells $\frac{4}{3}$ *Flemish* make? Multiply and divide, and you shall find 25 Ells $\frac{3}{5}$ *English*, and so many Ells *English* do 42 Ells $\frac{2}{3}$ *Flemish* contain; the like is to be done of all others.

7 *More*, I have bought a Piece of Tapestry, being 5 Ells $\frac{4}{4}$ long, and 4 Ells $\frac{2}{3}$ broad of *Flanders* Measure, I demand how many Ells square it maketh *English* measure?

Answ. First, forasmuch as 3 Ells *English* are worth 5 Ells *Flemish*, therefore put 3 Ells *English* into his square, in multiplying 3 by it self, which maketh 9; Likewise multiply 5 in it self squarely, and it will be 25; Then multiply 5 $\frac{3}{4}$, which is the length of the Piece, by 4 $\frac{2}{3}$, which is the breadth, and thereof cometh 26 Ells $\frac{5}{6}$ square, then say by the Rule of Three, if 25 Ells square of *Flemish* measure be worth 9 Ells square of *English* measure, what are 16 Ells $\frac{5}{6}$ *Flemish* worth? Multiply and divide, and you shall find that they are worth 9 Ells $\frac{33}{50}$ square of *English* measure.

8 *More*, At 3 *s.* 6 *d.* the Ell *Flemish*, what is the *English* Ell worth after the rate?

Answ. First say, if 5 Ells *Flemish* be worth 3 Ells *English*, what is 1 Ell *Flemish* worth? Multiply and divide, and you shall find $\frac{3}{5}$ of an *English* Ell. Then say again by the Rule of Three, if $\frac{3}{5}$ of an *English* Ell be worth 3 *s.* 6 *d.* what is 1 *English* Ell worth? Multiply and divide, and you shall find 5 *s.* 10 *d.* so much shall the *English* Ell be worth.

9 *More*, At 6 *s.* 8 *d.* the *Flemish* Ell square, what is the *English* Ell worth?

Answ. Say by the aforesaid Reason, if 25 Ells *Flemish* square, be worth 9 Ells square *English*, what is one Ell square *Flemish* worth? Multiply and divide, and you shall find $\frac{9}{25}$ of a square *English* Ell; then say, if $\frac{9}{25}$ of an *English* Ell be worth 6 *s.* 8 *d.* what is 1 square *English* Ell worth? multiply and divide, and you shall find 18 *s.* 6 *d.* $\frac{2}{9}$, so much shall one *English* Ell square be worth.

CHAP. V.

Of the Reducing of the Pawns of Genes into English Yards.

Note, *That* 100 *Pawns do make* 26 *Yards, and* 1 *Pawn is* $\frac{13}{50}$ *of a Yard after the same rate, and* 3 *Pawns* $\frac{11}{13}$ *do make* 1 *Yard.*

Example.

1. I Have bought 97 Pawns $\frac{1}{2}$ of *Genes* Velvet, and I would know how many Yards they will make?

Answ. Say by the Rule of Three, If 100 Pawns do make 26 Yards, what will 97 $\frac{1}{2}$ make? multiply and divide, and you shall have 25 Yards $\frac{7}{20}$, so many Yards do the 97 Pawns $\frac{1}{2}$ contain.

Or

Or otherwise, take some other Number at your pleasure, as 25 Pawns which do make 6 Yards $\frac{1}{2}$, then say by the Rule of Three, if 25 Pawns do make 6 Yards $\frac{1}{2}$, what will 97 Pawns $\frac{1}{2}$ make? Multiply and divide, and you shall find 25 Yards $\frac{7}{25}$, as before.

2 *More*, At 2 *s.* 7 *d.* the Pawn of *Genes*, what will the *English* Yard be worth after the rate?

Answ. Say by the Rule of Three, If $\frac{11}{50}$ of an *English* Yard be worth 2 *s.* $\frac{7}{12}$, what is $\frac{1}{1}$ Yard worth? Multiply and divide, and you shall find 9 *s.* 11 *d.* $\frac{3}{13}$. So much is the *English* Yard worth. Or otherwise, multiply 100 Pawns, which is 26 Yards, by 2 *s.* 7 *d.* and thereof cometh 258 *s.* 4 *d.* which you must divide by 26 Yards, and you shall find 9 *s.* 11 *d.* $\frac{3}{13}$, as before.

3 If 257 Pawns $\frac{1}{2}$ be worth 20 *l.* 16 *s.* 8 *d.* What is 1 Yard worth after the rate?

Answ. Say by the Rule of Three, if 257 Pawns $\frac{1}{2}$ be worth 20 $\frac{5}{6}$, what are 3 Pawns $\frac{11}{13}$ worth? Multiply and divide, and you shall find $\frac{1250}{4017}$ parts of a pound, which is worth 6 *s.* 2 *d.* $\frac{2742}{4017}$, and so much is 1 Yard worth.

CHAP. VI.

Of Merchandize sold by Weight.

1 AT 9 *d.* $\frac{1}{2}$ the ounce, what is the pound weight worth?

Answ. Say, If $\frac{1}{1}$ give $9\frac{1}{2}$, what will $\frac{16}{1}$ give? Multiply and divide, and you shall find 12 *s.* 8 *d.* so much is the pound worth.

Or otherwise by the Rules of Practice, for 6 *d.* take the $\frac{1}{2}$ of 16 *s.* which is 8 *s.* then for 3 *d.* take the $\frac{1}{4}$ of 16 *s.* which is 4 *s.* Finally, for the half-pence, take 16 *ob.* which are 8 *d.* then add all these Numbers together, and you shall find 12 *s.* 8 *d.* as before.

2 *More,* At 10 *d.* $\frac{1}{2}$ the ounce, what are 112 pound weight worth after the rate?

Answ. Reduce 112 pound into ounces, in multiplying 112 pound by 16 ounces, and you shall have 1792 ounces, then say by the Rule of Three, If $\frac{1}{1}$ X $10\frac{1}{2}$ $\frac{1792}{1}$. Multiply and divide, and you shall find 18816 *d.* which make 78 *l.* 8 *s.* and so much are the 112 *l.* worth, after 10 *d.* $\frac{1}{2}$ the ounce.

3 At 12 *s.* 8 *d.* the pound weight, what is the ounce worth?

Answ. Put 12 *s.* 8 *d.* into pence, and you shall have 152 *d.* then say by the Rule of Three, If 16 ounces cost 152 *d.* what shall 1 ounce cost?

coſt? Multiply and divide, and you ſhall find $9d.\frac{1}{2}$, ſo much is the ounce worth.

Or otherwiſe, take the $\frac{1}{4}$ of 12 s. 8 d. for 4 ounces, and thereof cometh 3 s. 2 d. then for 1 ounce take the $\frac{1}{4}$ of 3 s. 2 d. and you ſhall have 9 d. $\frac{1}{2}$ as before.

4 At 32 *l.* 10 *s.* the Quintal, that is to ſay, the 100 pound weight, what is 1 pound weight worth after the ſame rate?

Anſw. Put 32 *l.* 10 *s.* all into ſhillings, and you ſhall have 650 *s.* Then ſay by the Rule of Three, If 100 give 650, what will 1 give? Multiply and divide, and you ſhall find 6 *s.* 6 *d.* ſo much is the pound worth.

5 If one pound of Saffron do coſt me 18 *s.* 8 *d.* what ſhall 355 *l.* 10 ounces coſt me by the ſame price?

Anſw. Say by the Rule of Three, if $\frac{1}{1}$ X $18\frac{2}{3}$ $355\frac{5}{8}$. multiply and divide, and you ſhall find 331 *l.* 18 *s.* 4 *d.* ſo much are the 355 pound 10 ounces worth.

Brief Rules of Weight.

Who that multiplieth the pence that one pound weight is worth by 5, and divideth the Product thereof by 12, he ſhall find how many pounds in money the Quintal or 100 pound weight is worth.

And contrariwiſe, he that multiplieth the pounds of money that the 100 pound weight is worth by 12, and divideth the Product by 5, ſhall find how many pence the pound weight is worth.

Example.

At 17 *d.* the pound weight, what is the 100 pound weight worth?

Answ. Multiply 17 by 5, and thereof cometh 85, divide the same by 12, and you shall find 7 *l.* $\frac{1}{12}$ in money, which $\frac{1}{12}$ is worth 1 *s.* 8 *d.* So much is 100 pound weight worth.

More, At 13 *l.* the 100 pound weight, what is 1 *l.* weight worth?

Answ. Multiply 13 by 12, and thereof cometh 156, which divide by 5, and you shall find 31 *d.* $\frac{1}{5}$ which is 2 *s.* 7 *d.* $\frac{1}{5}$, and so much is one pound weight worth?

The like is to be done of Yards, Ells, or of any other measure, when we reckon but 5 score to the Hundred.

Brief Rules of Measure.

Who that multiplieth the pence that one Ell is worth by 2, and divideth the Product by 4, he shall find how many pounds in money the 120 Ells are worth, which 120 Ells we count but for an Hundred in this place, because of work, which measure is used for Canvas only.

Or otherwise, if you divide the pence that one Ell is worth by 2, you shall have in your Quotient the pounds that the said 120 Ells are worth, and if any thing remain, they are parts of a pound.

And contrariwise, he that multiplieth the pounds in money, that the 120 Ells are worth, by 4, and divideth the Product by

2,

2, ſhall find how many pence the Ell is worth.

Or otherwiſe, if you multiply the pounds that 120 Ells are worth, by 2, you ſhall find in the Product how many pence one Ell is worth.

Example.

At 10 *d.* the Ell, what are 120 Ells worth?

Anſw. Multiply 10 *d.* by 2, and thereof cometh 20, which divide by 4, and you ſhall find 5 *l.* ſo many pounds in money are 120 Ells worth at 10 *d.* the Ell.

Or otherwiſe, divide 10 *d.* by 2 *d.* and thereof cometh into your Quotient 5, which 5 doth repreſent 5 *l.* and ſo many pounds are the 120 Ells worth, as before.

More, At 9 *l.* the 120 Ells, what is one Ell worth?

Anſw. Multiply 9 *l.* by 4, and thereof cometh 36, which divide by 2, and you ſhall find 18 *d.* ſo much is one Ell worth.

Or otherwiſe, if you multiply 9 *l.* which is the price that 120 Ells are worth, by 2, you ſhall have in the Product 18, which 18 doth ſignifie the pence that 1 Ell is worth, when the 120 Ells do coſt 9 *l.* as before.

The like is to be done of all manner of Wares, which are ſold after 120 to the Hundred.

Brief Rules of our Hundred Weight here at London, *which is after* 112 *Pounds for the Hundred.*

Who that multiplieth the pence that one pound

pound weight is worth by 7, and divideth the Product by 15, shall find how many pounds in money the 112 pound weight is worth.

And contrariwise, he that multiplieth the pounds in money that 112 pound is worth by 15, and divideth the Product by 7, shall find how many pence one pound weight is worth.

Example.

At 9 *d.* the pound weight, what is the 112 pound weight worth?

Answ. Multiply 9 *d.* by 7, and thereof cometh 63, which divide by 15, and you shall find 4 *l.* $\frac{3}{15}$, which being abbreviated is $\frac{1}{5}$ of a pound, being worth 4 *s.* And thus the 112 pound is worth 4 *l.* 4 *s.* after the rate of 9 *d.* the pound.

At 8 *l.* the 112 pound weight, what is one pound weight worth?

Answ. Multiply 8 *l.* by 15, and thereof cometh 120, which divide by 7, and you shall find 17 *d.* $\frac{1}{7}$, so much is one pound weight worth, when the 112 pound is worth 8 *l.*

This business is readily performed by this following Table.

A Table

A Table shewing the Price of the Pound or the Hundred weight being 112 *Pound.*

price of 1l.		*price of a Hundred or* 112 l.			*price of one pound.*		*price of a Hundred or* 112 l.			*price of one pound,*		*price of a Hundred or* 112 l.			*price of* 1l.		*price of a Hundred or* 112 l.		
d.	*q*	*l.*	*s.*	*d.*	*d.*	*q.*	*l.*	*s.*	*d.*	*d.*	*q.*	*l.*	*s.*	*d.*	*d.*	*q*	*l.*	*s.*	*d.*
	1	0	2	4	6	1	2	18	4	12	1	5	14	4	18	1	8	10	4
	2	0	4	8		2	3	0	8		2	5	16	8		2	8	12	8
	3	0	7	0		3	3	3	0		3	5	19	0		3	8	15	0
1	0	0	9	4	7	0	3	5	4	13	0	6	1	4	19	0	8	17	4
	1	0	11	8		1	3	7	8		1	6	3	8		1	8	19	8
	2	0	14	0		2	3	10	0		2	6	6	0		2	9	2	0
	3	0	16	4		3	3	12	4		3	6	8	4		3	9	4	4
2	0	0	18	8	8	0	3	14	8	14	0	6	10	8	20	0	9	6	8
	1	1	1	0		1	3	17	0		1	6	13	0		1	9	9	0
	2	1	3	4		2	3	19	4		2	6	15	4		2	9	11	4
	3	1	5	8		3	4	1	8		3	6	17	8		3	9	13	8
3	0	1	8	0	9	0	4	4	0	15	0	7	0	0	21	0	9	16	0
	1	1	10	4		1	4	6	4		1	7	2	4		1	9	18	4
	2	1	12	8		2	4	8	8		2	7	4	8		2	10	0	8
	3	1	15	0		3	4	11	0		3	7	7	0		3	10	3	0
4	0	1	17	4	10	0	4	13	4	16	0	7	9	4	22	0	10	5	4
	1	1	19	8		1	4	15	8		1	7	11	8		1	10	7	8
	2	2	2	0		2	4	18	0		2	7	14	0		2	10	10	0
	3	2	4	4		3	5	0	4		3	7	16	4		3	10	12	4
5	0	2	6	8	11	0	5	2	8	17	0	7	18	8	23	0	10	14	8
	1	2	9	0		1	5	5	0		1	8	1	0		1	10	17	0
	2	2	11	4		2	5	7	4		2	8	3	4		2	10	19	4
	3	2	13	8		3	5	9	8		3	8	5	8		3	11	1	8
6	0	2	16	0	12	0	5	12	0	18	0	8	8	0	24	0	11	4	0

CHAP.

CHAP. VII.

Of Tare, Tret, and Cloff, being Allowances of Merchandize sold by Weight.

TAre is the Allowance for the weight of the Cask, Chest, or Bag wherein any Commodity is put.

Tret is an Allowance of 4 pound weight upon every 100 pound subtile weight, that is to allow 104 pound for 100 pound.

How to reduce gross Hundreds into pounds subtile and neat, you may see before in the Chapter of Reduction.

Cloff is an Allowance of 2 pound upon every Draught, which exceedeth 336 pound or 300 Gross weight.

1 At 12 *l.* the 100 subtile, what shall 987 pounds subtile be worth, in giving 4 pound weight upon every 100 for Tret?

Answ. Add 4 pound to 100, and you shall have 104; Then say by the Rule of Three, if 104 be worth 12 *l.* what are 987 pound weight worth? Multiply and divide, and you shall find 113 *l.* $\frac{21}{26}$, which is worth 17 *s.* 8 *d.* $\frac{4}{13}$. So much shall the 987 pound weight be worth.

104 | 12 | 987 | 113 $\frac{21}{26}$.

2 At

2 At 6 *s.* 8 *d.* the pound weight, what shall 345 *l.* $\frac{1}{2}$ be worth, in giving 4 pound weight upon every 100 for the Tret?

Answ. See first by the Rule of Three, what the 100 *l.* is worth, saying, If $\frac{1}{1}$ X 6 $\frac{2}{3}$ $\frac{100}{1}$. Multiply and divide, and you shall find 33 *l.* $\frac{1}{3}$, then add 4 *l.* to 100, and they are 104, then say again by the Rule of Three, if 104 pound be sold for 33 *l.* $\frac{1}{3}$, for how much shall 345 *l.* $\frac{1}{2}$ be sold? Multiply and divide, and you shall find 110 *l.* 14 *s.* 8 *d.* $\frac{12}{13}$. For so much shall the 345 $\frac{1}{2}$ be sold, at 6 *s.* 8 *d.* the pound, in giving 4 upon the Hundred.

3 *More*, If 100 *l.* be worth 36 *s.* 8 *d.* what shall 780 *l.* be worth, in rebating 4 *l.* upon every 100 for Tare?

Answ. Divide 780 by 26 (because the Tret, which is 4 *l.* is the 26th part of 100) and you shall find 30 *l.* is to be abated for the Tret out of 780 *l.* so there is 750 *l.* neat to be paid for: Then say by the Rule of Three, If $\frac{100}{1}$ cost 36 *s.* $\frac{2}{3}$, what $\frac{750}{1}$? *Ans.* 275 *s.*

4 *More*, Whether doth he lose more, that giveth 5 *l.* upon the 100, or he that rebateth 5 *l.* in the 100 for Tare and Cloff?

Answ. First note, that he which giveth 5 *l.* upon the 100, giveth 105 for 100, and he which rebateth 5 *l.* in the 100, giveth the 100 for 95: Therefore say by the Rule of Three, if 105 be given for 100, for how much shall the 100 be given? Multiply and divide, and you shall find 95 $\frac{5}{21}$; and he which rebateth 5 in the 100, maketh but 95 of a 100: so that he loseth 5 in the 100, and the other which giveth

5 upon

5 upon the 100, loseth but 4 $\frac{16}{21}$ upon the 100. Thus you may see that he which rebateth 5 in the 100, loseth more by $\frac{5}{21}$ in the 100, than the other, which gave 5 upon the 100 for Tare and Cloff, which $\frac{5}{21}$ though it be but a small matter in 100, not being full a quarter of a pound, yet in 21 Hundred, it comes to 5 *l.* in 42 Hundred to 10 *l.* and so in greater Quantities to more.

5 If 100 *l.* of Alum cost me 26 *s.* 8 *d.* how shall I sell the pound weight to gain after the rate of 10 upon the 100?

Answ. Put 26 *s.* 8 *d.* all into pence, and you shall have 320 *d.* Then say by the Rule of Three, If 100 give 110, what shall 320 give? Multiply 320 by 110, and divide the Product by 100, and you shall find 352 *d.* Then say again, if 100 pound be worth 352 *d.* what is 1 pound worth? Multiply and divide, and you shall have 3 *d.* $\frac{26}{50}$, which $\frac{26}{50}$ is worth $\frac{1}{2}$ and $\frac{1}{25}$ of $\frac{1}{2}$, that is to say, the pound weight shall be worth 3 *d.* $\frac{1}{2}$ $\frac{1}{25}$ of a half-peny in gaining 10 upon the 100.

6 If 1 pound weight cost me 6 *s.* 10 *d.* and I sell the same for 7 *s.* 2 *d.* I demand how much I shall gain upon the 100 *l.* of money after the rate?

Answ. Say by the Rule of Three, If 6 $\frac{5}{6}$ yield 7 $\frac{1}{6}$: what will $\frac{100}{1}$ yield? Put the whole Numbers into their broken, then multiply and divide, and you shall find 104 $\frac{36}{41}$, from which subtract 100, and there resteth 4 *l*, $\frac{36}{41}$, so much is gained upon the 100 *l.* of money after the rate.

7 *More*, If 1 pound cost me 5 *s.* 4 *d.* and

I ſell the ſame again for 4 *s.* 9 *d.* I demand how much I ſhall loſe upon the 100 pound of money?

Anſw. Say, If 5 $\frac{1}{3}$ do give but 4 $\frac{3}{4}$, what what ſhall $\frac{120}{1}$ give? Put the whole Numbers into their broken, then multiply and divide, and you ſhall find 89 $\frac{1}{16}$, which you muſt ſubtract from 100, and there will remain 10 *l.* $\frac{15}{16}$, ſo much is loſt upon the 100 *l.* of money.

8 *More*, If the pound weight coſt me 3 *s.* 2 *d.* and I ſell it again for 4 *s.* 4 *d.* how much ſhall I gain upon 20 *s*?

Anſw. Say, If 3 $\frac{1}{6}$ give 4 $\frac{1}{3}$, what ſhall $\frac{20}{1}$ give? Multiply and divide, and you ſhall find 27 *s.* $\frac{7}{19}$, from which abate 20 *s.* and there will remain 7 *s.* $\frac{7}{19}$, which is 4 *d.* $\frac{8}{19}$, and ſo much is gained upon the pound of money, that is to ſay, upon 20 *s.*

9 If the pound weight coſt me 4 *s.* 4 *d.* and I ſell it again for 3 *s.* 2 *d.* I demand how much I ſhall loſe in the pound of money, that is to ſay, in 20 *s.*

Anſw. Say, If 4 $\frac{1}{3}$ give but 3 $\frac{1}{6}$, what will $\frac{20}{1}$ give? Multiply and divide, and you ſhall find 14 *s.* $\frac{8}{13}$, which you muſt abate from 20 *s.* and there will remain 5 *s.* $\frac{5}{13}$, which $\frac{5}{13}$ is worth 4 *d.* $\frac{8}{13}$ of a peny, and ſo much is loſt upon the pound of money.

CHAP.

CHAP. VIII.

Of certain Questions done by the double Rule, and also by the Rule of Three composed.

10 A Merchant hath sold Wines for the Sum of 300 *l.* and he hath gained therein after 10 *l.* upon the 100 *l.* The Question is to know how much he gained in all?

Answ. Say by the Rule of Three, if 110 *l.* gain 10 *l.* what will 300 *l.* gain? Multiply and divide, and you shall find 27 *l.* $\frac{3}{11}$, and so much hath he gained in all.

Mr *Bridges* in his Book of Arithmetick chargeth this and most other Authors with error in their Rules about resolving such Questions as these, and saith, the Question is thus to be answered.

If 100 *l.* gain 10 *l.* what 300? *Answ.* 30 *l.* and not 27 *l.* $\frac{3}{11}$, according to our Author.

But in such Questions as these, the chief business is in understanding the Nature of the Question, *viz.* whether 10 *l.* should be gained by every 100 *l.* laid out, or whether 10 *l.* should be gained in every 100 *l.* received.

Indeed if you reckon 10 *l.* was gained in every 100 *l.* received, then in the 300 *l.* it is plain that

there

there was 30 *l.* gained according to Mr *Bridges.*

But if you reckon that every 100 *l.* laid out should bring in 10 *l.* profit, then either for his 300 *l.* he should receive 330 *l.* or else he must not lay out 300, but 272 *l.* $\frac{8}{11}$, for as 110 *l.* to 100 *l.* So 300 *l.* to 272 *l.* $\frac{8}{11}$, and so his profit being 27 $\frac{3}{11}$ according to our Author, makes the Sum received just 300, and his gains 10 *l.* for every 100 *l.* laid out, so that the business is two several Questions.

Thus I had rather reconcile these Masters of this Art, than set them together by the ears.

Yet to me it seems most proper to reckon the profit by the money laid out, that is, that you make 110 of 100 laid out, rather than to reckon 10 *l.* gained in 100 *l.* received. These two Questions are two different things; much of the same Nature is the fourth Question of Tret in the former Chapter, which will produce some loss, if you abate 4 out of 100, and not reckon 104 for 100. And so it is likewise in the Difference between the Interest and Rebate of 100 *l.* for a year or any other time.

11 A Merchant hath bought a Piece of *Hamshire* Kersie containing 18 Yards, for the price of 4 *l.* 10 *s.* The Question is, to know how many Yards he shall sell for 33 *s.* 4 *d.* to gain 20 *s.* in the whole piece?

Answ. Add 20 *s.* unto 4 *l.* 10 *s.* and they make 5 *l.* 10 *s.* Then say by the Rule of Three, If 5 *l.* $\frac{1}{2}$ yield me 18 Yards, what will 1 *l.* $\frac{2}{3}$ yield? Multiply and divide, and you shall find 5 Yards $\frac{5}{11}$; and so many Yards shall he sell to gain 20 *s.* in the whole Piece.

12 A Merchant hath sold Sugars for the Sum of 600 *l.* ready money, and he hath gained in the whole, the Sum of 60 *l.* The Question is, to know how much he hath gained upon the 100 *l.*

Answ. First, you must subtract 60 *l.* from 600 *l.* and there will remain 540 *l.* Then say by the Rule of Three, If 540 *l.* do gain 60 *l.* what will 100 *l.* gain? Multiply and divide, and you shall find 11 *l.* $\frac{1}{9}$; And so much had he gained upon the 100 *l.*

13 *More*, If 1 pound weight of Mace cost me 5 *s.* 10 *d.* and afterward I sell the same for 6 *s.* the pound, to be paid for it at the end of three moneths; I demand how much I shall gain upon 100 pound in 12 moneths, after the rate?

Answ. Say by the first part of the Rule of Three composed, If 5 *s.* $\frac{5}{6}$ in $\frac{3}{1}$ moneths do gain $\frac{1}{6}$ of a shilling, which is 2 *d.* what will $\frac{120}{1}$ *l.* gain in $\frac{12}{1}$ moneths? Multiply and divide, and you shall find 11 *l.* $\frac{3}{7}$; and so much shall I gain in 12 moneths after the rate.

14 *More*, If one Piece of Kersie cost me 35 *s.* for what price may I sell the same, to be paid for it at the end of 3 moneths, so that I may gain thereby after the rate of 10 *l.* upon the 100 *l.* in 12 moneths?

Answ. Say by the first part of the Rule of Three composed, If 100 *l.* in 12 moneths gain 10 *l.* what will 36 *s.* gain in 3 moneths? Multiply and divide, and you shall find $\frac{1080}{1200}$ of a shilling, which being abbreviated, doth make $\frac{9}{10}$ of a shilling, which is worth 10 *d.* $\frac{4}{5}$, the

same

same you must add with 36 *s.* and then shall you have 36 *s.* 10 *d.* $\frac{4}{5}$; and for that price I must sell the Piece of Kersie, to gain therein 10 *l.* upon the 300 *l.* in 12 moneths, and giving 3 moneths time for the paiment.

15 *More*, If 6 Yards of Northern Kersie cost me 8 *s.* and I sell 4 Yards of the same Kersie for 6 *s.* I demand whether I gain or lose, and how much upon a 100 *l.* of money?

Answ. First, you must seek what the 4 Yards of Kersie did cost: saying by the Rule of Three, If 6 Yards cost 8 *s.* what will 4 Yards cost? Multiply and divide, and you shall find 5 *s.* $\frac{1}{3}$, and so much did the said 4 Yards cost, therefore abate the same 5 $\frac{1}{3}$ from 6 *s.* and there will remain $\frac{2}{3}$ of a shilling, which $\frac{2}{3}$ is gained in the same 4 Yards of Kersie. Then say again by the Rule of Three, If 5 $\frac{1}{3}$ gain $\frac{2}{3}$, what will $\frac{100}{1}$ gain? Multiply and divide, and you shall find 12 and $\frac{8}{16}$, which $\frac{8}{16}$ being abbreviated is $\frac{1}{2}$. Therefore it appeareth that I shall gain 12 *l.* $\frac{1}{2}$ upon the 100 *l.* in selling 4 Yards of the said Kersie for 6 *s.*

16 *More*, A Merchant hath bought a piece of Damask which cost him 8 *s.* the Yard, ready money, and he selleth the same again to another Merchant for 10 *s.* the Yard, but he giveth two daies for the paiment, that is to say, 2 moneths for one half, and 5 moneths for the other half. The Question is, to know how much the said first Merchant doth gain upon 100 *l.* in 12 moneths, after the rate aforesaid?

Answ. You must add the 2 moneths and the

5 moneths both together, and they make 7 moneths, whereof you must take the one half, which is 3 moneths $\frac{1}{2}$; and at that time the second Merchant ought to have paid the whole at one entire paiment. And therefore say by the first part of the Rule of Three composed, If $\frac{8}{1}$ *s.* in 3 moneths $\frac{1}{2}$, do gain $\frac{2}{1}$ *s.* what will $\frac{100}{1}$ gain in $\frac{12}{1}$ moneths? Multiply and divide, and you shall find 85 *l.* $\frac{5}{7}$; and so much doth the first Merchant gain upon the 100 in 12 moneths.

17 A Merchant hath bought Velvet at 13 *s.* 9 *d.* the Yard ready money, and he selleth the same for 14 *s.* 3 *d.* the Yard, to be paid $\frac{1}{3}$ part in ready money, $\frac{1}{4}$ part at 3 moneths, and the rest which is $\frac{5}{12}$, is to be paid to him at 5 moneths. The Question is, to know how much the first Merchant doth gain upon the 100 *l.* in 12 moneths, after the same rate?

This is the common way, but it is somewhat faulty, as you may see before in the Equation of Paiments by Rebate.

Answ. See first at what time all the paiments ought to be paid at once; and to know the same, you must multiply every several paiment, by the time it ought to be paid, and add them together, then divide the Product by the total Sum of all the paiments being added together, and your Quotient will shew at what time all the paiments ought to be paid at once, as in the former Example: $\frac{1}{3}$ part in ready money is not multiplied by any time, because it is paid presently, then $\frac{1}{4}$ being multiplied by 3 moneths, maketh $\frac{3}{4}$ of a moneth, and the rest being $\frac{5}{6}$ multiplied by 5 moneths, bringeth 2 $\frac{1}{12}$, then add $\frac{3}{4}$ and 2 $\frac{1}{12}$ together, and they make 2 moneths $\frac{5}{6}$, which is the just time that all the

paiments

paiments ought to be paid at once. And therefore say by the first part of the Rule of Three composed, If 13 $\frac{1}{2}$ in 2 moneths $\frac{5}{6}$ do gain $\frac{3}{4}$ of a pound, what will 100 *l.* gain in 12 moneths after the rate? Multiply and divide, and you shall find 23 *l.* $\frac{9}{17}$; and so much doth he gain upon the 100 *l.* in 12 moneths.

18 A Merchant hath bought Fustians, which cost him 22 *s.* 6 *d.* the piece ready money, and he will sell the same at 24 *s.* the piece. The Question is, to know what time he ought to give for the paiment of the same, to the end he may gain after 9 *l.* upon the 100 *l.* in 12 moneths.

Answ. Say, If 22 $\frac{1}{2}$ do gain 1 $\frac{1}{2}$, what will $\frac{120}{1}$ gain? Multiply and divide, and you shall find 6 $\frac{2}{3}$ of gain. Then say again by the Rule of Three, If $\frac{9}{1}$ of gain do require $\frac{12}{1}$, what will 6 $\frac{2}{3}$ of gain require? Multiply and divide, and you shall find 8 $\frac{8}{9}$, which is 8 moneths and $\frac{8}{9}$, and so long time ought he to give to gain after the rate of 9 *l.* upon the 100 *l.* in 12 moneths.

19 A Merchant hath bought a piece of Satten, being in length 20 Yards, which did cost him 12 *l.* and 10 *s.* ready money, I demand for what price he shall sell the Yard, to be paid at the end of 2 moneths, so that he may gain after the rate of 10 *l.* upon the 100 *l.* in 12 moneths?

Answ. See first what the Yard did cost him at the first: saying by the Rule of Three, If 20 Yards cost 12 *l.* 10 *s.* what will 1 Yard cost? Multiply and divide, and you shall find

12 *s.* 6 *d.* Then ſay again by the Rule of Three, If 12 moneths give me 10 *l.* what will 2 moneths give? Multiply and divide, and you ſhall find 1 *l.* $\frac{2}{3}$; add therefore the ſaid 1 $\frac{2}{3}$ unto 100, and they are 101 $\frac{2}{3}$, Say therefore once again by the Rule of Three, If $\frac{122}{1}$ do give me 101 $\frac{1}{3}$, what will 12 give? Multiply and divide, and you ſhall find 12 *s.* and $\frac{17}{24}$, which is worth 8 *d.* $\frac{1}{2}$, and for 12 *s.* 8 *d.* $\frac{1}{2}$ muſt he ſell the Yard of Satten, giving 2 moneths time for the paiment, to gain after the rate of 10 *l.* upon the 100 *l.* in 12 moneths.

20 *More*, If 1 pound weight of Cinnamon coſt me 8 *s.* ready money, for what price ſhall I ſell 100 pound weight of the ſame, to be paid the $\frac{1}{4}$ at 1 moneth, and the reſidue at the end of 3 moneths; ſo that I may gain after 9 *l.* upon the 100 *l.* in 12 moneths after the rate?

Anſw. Seek firſt in how long time both the paiments ſhould be made at once; which to do, you muſt multiply each paiment of money by the time when it ought to be paid, that is to ſay, you muſt multiply the firſt paiment, which is $\frac{1}{4}$ part by $\frac{1}{1}$ moneth, and thereof cometh $\frac{1}{4}$ of a moneth. Likewiſe you muſt multiply the next paiment which is $\frac{1}{4}$ by 3 moneths, and thereof will come 2 moneths $\frac{1}{4}$. Then add $\frac{1}{4}$ of a moneth, and two moneths $\frac{1}{4}$ both together, and they make two moneths $\frac{1}{2}$, which is the time that both the paiments ought to be paid at once. Then ſay by the Rule of Three, If 12 moneths give

$\frac{1}{4}$	$\frac{1}{1}$	$\frac{1}{4}$
$\frac{3}{4}$	$\frac{3}{1}$	2 $\frac{1}{4}$
Month		2 $\frac{1}{2}$

9 *l.*

9 *l.* what will 2 moneths ½ give? Multiply and divide, and you ſhall find 1 $\frac{7}{8}$: ſay again by the Rule of Three, If 1 *l.* weight coſt me 8 *s.* what will 100 *l.* coſt? Multiply and divide, and you ſhall find 40 *l.* Then ſay once again, If $\frac{100}{1}$ give 101 $\frac{7}{8}$, what will $\frac{40}{1}$ give? Multiply and divide, and you ſhall find 40 $\frac{3}{4}$: And for 40 *l.* 15 *s.* I muſt ſell 100 *l.* weight of Cinnamon, to be paid at the two ſeveral times aforeſaid, to gain therein after the rate of 9 *l.* upon the 100 *l.* in 12 moneths, as by Example aforeſaid.

20 When the Quarter of Wheat doth coſt 6 *s.* 8 *d.* the Loaf of Bread weighing 20 ounces, is ſold for a half-peny, I demand that if the Quarter of Wheat did coſt 10 *s.* for how much ſhall the Loaf of Bread be ſold, that weigheth 16 ounces?

You ſhall anſwer by the firſt part of the Rule of Three compoſed, which is mentioned in the Ninth Chapter of the Firſt Part of this Book, where you muſt ſay by the ſame firſt part of the Rule of Three compoſed, if $6\frac{2}{3} \mid \frac{20}{1} \mid \frac{1}{2} \mid \frac{10}{1} \mid \frac{16}{1}$.

Then multiply the firſt Number by the ſecond, and the Product thereof ſhall be your Diviſor. Likewiſe multiply the other three Numbers the one by the other, and the Product thereof ſhall be your Dividend: as thus, firſt multiply 6 $\frac{2}{3}$ by $\frac{20}{1}$, and thereof cometh $\frac{400}{3}$ for your Diviſor, then multiply $\frac{1}{2}$ by $\frac{10}{1}$, and the Product thereof by $\frac{16}{1}$, ſo you ſhall have $\frac{160}{2}$ for your Number that is to be divided, then divide $\frac{160}{2}$ for your Number that

is to be divided, then divide $\frac{160}{2}$ by $\frac{400}{3}$, and thereof cometh $\frac{480}{800}$, which being abbreviated bringeth $\frac{3}{5}$ of a peny, and for that price must the Loaf of Bread be sold, which weigheth 16 ounces, when the Quarter of Wheat is worth 10 *s.*

Or otherwise by the Rule of Three at two times. First say, If $\frac{20}{1}$ ounces give $\frac{1}{2}$, what will $\frac{16}{1}$ ounces give? Multiply and divide, and you shall find $\frac{2}{5}$ of a peny, then say again, if $6\frac{2}{3}$ give me $\frac{2}{5}$, what will $\frac{10}{1}$ give? Multiply and divide, and you shall find $\frac{3}{5}$ of a peny, as before is said.

One of the best waies to understand these Questions of the Rule of Three composed, is that which is taught by Mr *Bridges* in his Arithmetick, which is to set the six Terms in two Rows one under another, so that like Terms may answer to their like. As now in this Question of the Price of the Loaf, if it be set thus,

Quarter of Wheat.	*Weight of Loaf.*	*Price of Loaf.*
6 *s.* $\frac{2}{3}$	$\frac{20}{1}$ *oz.*	$\frac{1}{2}$ *d.*
10 *s.*	$\frac{16}{1}$	*what?*
		Answ. $\frac{3}{5}$ *d.*

If the Answer or Term to be found out, fall in the sixth and last place, as in this Example, then the Question is to be done by direct proportion.

But if the Answer or Term to be found out fall in the fourth or fifth place, then the Question is to be resolved by the Backer Rule

of

of Three, or indirect proportion, as in the 22th Queſtion.

And hereby alſo you may ſee the better how to ſet the Queſtion to the Rule of Three at twice, which you either do as before beginning with the two middle Numbers, *viz.*

First, *As* $\frac{20}{1}$ *to* $\frac{1}{2}$ :: *So* $\frac{16}{1}$ *to* $\frac{2}{5}$.
Then, *As* 6 $\frac{2}{3}$ *to* $\frac{2}{5}$ :: *So* $\frac{10}{1}$ *to* $\frac{3}{5}$.

Or elſe beginning with the two firſt Numbers.

Firſt, *As* 6 $\frac{2}{3}$ *to* $\frac{1}{2}$ :: *So* $\frac{10}{1}$ *to* $\frac{3}{4}$.
Then, *As* $\frac{20}{1}$ *to* $\frac{3}{4}$ :: *So* $\frac{16}{1}$ *to* $\frac{3}{5}$.

21 When the Carriage of one Hundred weight of Merchandize 50 miles doth coſt 5 *s.* what ſhall the Carriage of 500 weight coſt me for 16 miles?

Anſw. By the firſt part of the Rule of Three compoſed, ſaying, If 100 | 50 | 5 | 500 | 16, multiply 100 by 50, the Product will be 5000, which ſhall be your Diviſor. Then multiply 5 times 500 by 16, and thereof cometh 40000 for your Dividend. Therefore divide 40000 by 5000, and you ſhall find 8 *s.* ſo much ſhall coſt the Carriage of 500 weight 16 miles.

Or otherwiſe by the double Rule of Three, that is to ſay, by the Rule of Three at twice, firſt ſay, If 50 miles pay 5 *s.* what ſhall 16 miles pay? Multiply and divide, and you ſhall find 1 *s.* $\frac{3}{5}$; Then ſay again, If 100 weight coſt me 1 *s.* $\frac{3}{5}$, what ſhall 500 weight coſt? Multiply and divide, and you ſhall find 8 *s.* as before.

22 When

22 When the Carriage of 100 pound weight of Merchandize 84 miles doth cost me 6 *s.* how many miles may I have 64 pound weight carried for 3 *s.* 4 *d*?

Answ. By the second part of the Rule of Three composed, and say, if $\frac{100}{1} | \frac{84}{1} | \frac{6}{1} | \frac{64}{1} | 3\frac{1}{3}$. Then multiply the fourth Number $\frac{64}{1}$ by the third Number $\frac{6}{1}$, and thereof cometh $\frac{384}{1}$ for your Divisor. Likewise multiply $3\frac{1}{3}$ by $\frac{100}{1}$, and by $\frac{84}{1}$, and you shall have in the Product $\frac{84000}{3}$, then divide $\frac{84000}{3}$ by $\frac{384}{1}$, and you shall find 72 miles and $\frac{11}{12}$ of a mile. So many miles shall the 64 pound weight be carried for 3 *s.* 4 *d.*

Otherwise by the Rule of Three at twice: first say, If 100 weight cost me 6 *s.* what will 64 pound weight cost? Multiply and divide, and you shall find 3 *s.* $\frac{21}{25}$; then say, if 3 $\frac{21}{25}$ be paid for 84 miles carriage: for how many miles shall 3 *s.* $\frac{1}{3}$ be paid? Multiply and divide, and you shall find 72 miles $\frac{11}{12}$, as before.

If you set this Question according to the former way in two Lines, it will stand thus,

If	100 *Weight*,	84 *Miles*,	6 *shillings*.
	64		$3\frac{1}{3}$

Answer $72\frac{11}{12}$ *Miles.*

Here the Answer or Term to be found falls in the fifth place, which shews the Question cannot be answered, by the Rule of direct proportion, but the order must be inverted.

23 If 100 Horses in 100 days spend 180

Quarters

Quarters of Oats: how many Quarters of Oats will 350 Horses spend in 150 days?

Answ. By the first part of the Rule of Three composed, you must multiply 180 times 350, by 150, and divide the Product by 100 times 100, and you shall find 945 Quarters; So many Quarters of Oats will 350 Horses spend in 150 days.

Or otherwise by the Rule of Three at twice. First say, If 100 Days yield me 180 Quarters of Oats, what shall 150 Days yield? Multiply and divide, and you shall find 270 Quarters; then say again, If 100 Horses spend 270 Quarters of Oats, how many Quarters of Oats will 350 Horses spend? Multiply and divide, and you shall find 945 Quarters, as before.

CHAP. IX.

Of the Rule of Fellowship; without any time limited.

THE Rule of Fellowship is thus, You must set down each mans Sum of Money, that he layeth into Company, every one directly under the other, which Sums you must add all together, and the Total Sum of all their whole Stocks being thus assembled, must be your common Divisor, to the finding out of every

every mans part of the Gain. Then you must multiply either the Gain or else the Loss, which soever of them do happen, by each mans portion of money that he laid in, and divide the Products by the said Divisor: so shall you have in your Quotient every mans part of the Gain, if any thing be gained, or else of the Loss, if any thing be lost.

Example.

1 Two Merchants have laid their money in Company together: the first laid in 500 *l.* The second laid in 300 *l.* and with trading they have gained 64 *l.* I demand how much each man shall have of the same gains, according to the money that he laid in?

Answ. Add 500 and 300 both together, which are the Parcels or Sums that they both laid in, and thereof cometh 800 for your Divisor; then say by the Rule of Three, If 800 *l.* which is the whole stock, gain 64 *l.* what shall 500 *l.* gain? (which is the first mans money that he laid in) Multiply and divide, and you shall find 40 *l.* for the first mans part of the Gain: then say, If 800 give 64, what will 300 give? Multiply and divide, and you shall find 24 *l.* for the second mans part of the Gain.

500	
300	800 — 64 — 500 — 40
800	800 — 64 — 300 — 24

Or

Or otherwise, put 500 *l.* which is the first mans money that he laid in, over the 800 *l.* which is the whole Stock, and you shall have $\frac{500}{800}$, which being abbreviated, make $\frac{5}{8}$, and such part of the Gain shall the first man take, that is to say, $\frac{5}{8}$ of 64*l.* which is 40 *l.* And consequently by the same manner the second shall take the $\frac{3}{8}$ of 64, which is 24*l.* for his part of the Gain, as before.

$\frac{5}{8}$ X $\frac{3}{8}$ *which reduced makes* $\frac{40}{64}$ $\frac{24}{64}$

2 Two Merchants have companied together, the first laid in 640 *l.* and he taketh $\frac{5}{8}$ parts of the Gain, I demand how much the second Merchant laid in?

Answ. Seeing that the first Merchant taketh $\frac{5}{8}$ of the gain, it follows that the second Merchant must have $\frac{3}{8}$, which is the rest, and therefore say by the Rule of Three, If $\frac{5}{8}$ of the Gain, which the first man taketh, did lay into the Stock $\frac{640}{1}$; how much shall $\frac{3}{8}$ of the Gain lay in, which is the second mans Gain? Multiply and divide, and you shall find 384*l.* so much ought the second man to lay into Company.

3 Two Merchants have companied together, the first man laid in 640 *l.* and the second hath laid in so much money for his part, that he must have 60 *l.* for his part of 100 *l.* that they have gained: I demand how much the second man did lay into Company.

Answ. Seeing that the second man taketh 60 *l.* of the Gain, it followeth that the first must have the rest of the 100 *l.* which is but

40 *l.*

40 *l.* Therefore ſay by the Rule of Three, If 40 *l.* do lay in 640 *l.* what ſhall 60 *l.* lay in? Multiply and divide, and you ſhall find 960 *l.* ſo much did the ſecond Merchant lay in.

4 Two Merchants have companied together, The firſt laid in 83 *l.* 6 *s.* 8 *d.* The ſecond laid in 170 Ducates, and they have gained 100 *l.* of which the firſt man muſt have 60 *l.* I demand what the Ducate was worth?

Anſw. Seeing that the firſt man muſt have 60 *l.* it followeth that the ſecond muſt have 40 *l.* Therefore ſay by the Rule of Three, If 60 *l.* of Gain that the firſt man taketh, did lay in 83 *l.* 6 *s.* 8 *d.* Principal, how much ſhall 40 *l.* Gain put in, which is the Gain that the ſecond man taketh? Multiply and divide, and you ſhall find 55 *l.* $\frac{5}{9}$, ſo much are the 170 Ducates worth. Then put 55 *l.* $\frac{5}{9}$ into ſhillings, and you ſhall have 1111 *s.* $\frac{1}{9}$: ſo then to know what the Ducate is worth, Say by the Rule of Three, If the $\frac{170}{1}$ give 1111 $\frac{1}{9}$, what will $\frac{1}{1}$ give? Multiply and divide, and you ſhall find 6 *s.* 6 *d.* $\frac{22}{31}$, ſo much is the Ducate worth.

5 Two Merchants have companied together, The ſecond man laid in more by 30 *l.* than did the firſt man, and they gained 120 *l.* of which the firſt man ought to have 50 *l.* I demand what each of them did lay in?

Anſw. From 120 *l.* abate 50 *l.* and there reſteth 70 *l.* for the ſecond mans part: ſo that by this means the ſecond man (becauſe he laid in 30 *l.* more than the firſt man did) he taketh

20 *l.*

20 *l.* more of the Gain, and therefore say by the Rule of Three, If 20 *l.* Gain did lay in 30 *l.* Principal, how much shall 50 *l.* Gain lay in? Multiply and divide, and you shall find 75 *l.* so much did the first man lay in, and consequently the second laid in 105 *l.*

6 Two Merchants have companied together, the second hath laid in twice so much as the first man did, and 10 *l.* more, and they have gained 100 *l.* of which the first ought to have 32 *l.* for his part: I demand how much each of them did lay into Company?

Answ. If it were not for the 10 *l.* that the second man laid in more than the first, he should have had but 64 *l.* of the Gain, which is the double of the first mans part; But because he laid in 10 *l.* more, he hath therefore 4 *l.* more of the Gain, and therefore say by the Rule of Three, If 4 *l.* Gain did lay in 10 *l.* of Principal (which was over and above the double of the first mans laying in) what shall 32 *l.* of Gain lay in, which is the first mans part of the Gain that he taketh? Multiply and divide, and you shall find 80 *l.* for the first mans laying in, and so consequently 170 *l.* for the second mans portion that he laid in.

7 Two Merchants have companied together, and they have gained 100 *l.* of which the first must have after the rate of 10 *l.* upon the 100 *l.* and the second must have after the rate of 15 *l.* upon the 100 *l.* I demand how much each of them ought to have?

Answ. Put 10 *l.* for the first mans laying in, and 15 *l.* for the second mans laying in,

Add

Add therefore 10 *l.* and 15 *l.* together, and they make 25 *l.* Then put 10 over 25, and it is $\frac{10}{25}$, which being abbreviated are $\frac{2}{5}$; Therefore he that taketh 10 *l.* upon the 100 *l.* must have the $\frac{2}{5}$ of the Gain, which is 40 *l.* Then put 15 over 25, and it is $\frac{15}{25}$, which being abbreviated are $\frac{3}{5}$; therefore the second must have $\frac{3}{5}$ of the 100 *l.* which is 60 *l.*

8 Two Merchants have companied together, The first laid in 46 *l.* 18 *s.* and the second laid in 33 *l.* 2 *s.* and they have gained 30 *l.* I demand how much each man shall have for his part of the Gain?

Answ. Add 46 *l.* 18 *s.* and 33 *l.* 2 *s.* together, and you shall find 80 *l.* for your common Divisor; then say, If 80 *l.* which is all their Stock, gain 30 *l.* what will 46 $\frac{9}{10}$ gain, which is the money that the first man laid in? Multiply and divide, and you shall find 17 *l.* 11 *s.* 9 *d.* for the first mans part of the Gain. Then say again by the Rule of Three, If 80 *l.* gain 30 *l.* what will 33 $\frac{1}{10}$ gain, which was the second mans money that he laid in? Multiply and divide, and you shall find 12 *l.* 8 *s.* 3 *d.* for the second mans part of the gain.

And after the same manner shall you do, in case that there were 3 or 4 Merchants that would company together, adding all and every of their Sums of money (which they lay into the Stock) into one total Sum, which shall be your common Divisor, and then work with the rest, as is taught in the former Question of The Rule of Company.

Example,

Example.

9 Three Merchants have companied together, the first laid in I know not how much: the second did put in 20 Pieces of Cloth: and the third hath laid in 500 *l.* So at the end of their Company, their Gains amount to 1000 *l.* whereof the first man ought to have 350 *l.* and the second must have 400 *l.*

Now I demand how much the first man did lay in, and for how much the 20 pieces of Cloth were put into Company?

Answ. Seeing that the first and the second Merchants must have 750 *l.* for their part of the Gain; Then the third man must have the rest of the 1000 *l.* which is 250 *l.* And therefore say, by the Rule of Three, If 250 *l.* Gain come of 500 *l.* Principal, of how much shall come 350 *l.* Gain, which the first man taketh? Multiply and divide, and you shall find 700 *l.* so much did the first man lay in. Then say, If 250 *l.* Gain come of 500 *l.* Principal, of how much shall come 400 *l.* which is the Gain that the second man taketh? Multiply and divide, and you shall find 800 *l.* For that price were the twenty Pieces of Cloth laid into Company.

10 Three Merchants have gained 100 *l.* The first must have the $\frac{1}{2}$: The second must have the $\frac{1}{3}$: and the third must have the $\frac{1}{4}$: I demand how much every man must have of the Gain?

Answ. Reduce $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$, into one common Denomination, after the order of the se-

cond Reduction in Fractions, and you shall find $\frac{12}{24}$ for the $\frac{1}{2}$, $\frac{8}{24}$ for the $\frac{1}{3}$, and $\frac{6}{24}$ for the $\frac{1}{4}$, Then take 12 for the first mans laying in, 8 for the second mans laying in; and 6 for the third mans laying in; which three Numbers being added together, shall be your common Divisor, and they make 26. Then multiply 100 *l.* by 12 for the first man: then again 100 *l.* by 8, for the second: and last of all 100 *l.* by 6, for the third man, and divide the Products of every Multiplication by 26: So shall you find 46 *l.* $\frac{2}{13}$ for the first mans part of the Gain: 30 *l.* $\frac{10}{13}$ for the second mans part, and 23 *l.* $\frac{1}{13}$ for the third mans part.

Dr *Record* in his Arithmetick, makes a just Exception against such Questions as these, they being not proper, and artificially propounded, for the half of 100 *l.* is properly 50 *l.* a third part is 33 *l.* 6 *s.* 8 *d.* and a quarter is 23 *l.* which makes in all 108 *l.* 6 *s.* 8 *d.* So that if the first have their parts, the third man will fall short. Men must therefore have a care of such Bargains, that the parts may be equal to the whole; But if they exceed, this is a good way in equity to proportion them, or else they may cozen one another by such Divisions, which are either more or less than the whole amounts to, as in the next Question.

11 Two Merchants have gained 100 *l.* The first must have $\frac{1}{2}$ and 5 *l.* more, the second must have $\frac{1}{3}$ and 4 *l.* more, I demand how much each of them shall have?

Answ. First, from 100 abate 5 and 4, which are 9, so there will remain 91, then take the $\frac{1}{2}$ of

of 100 *l.* which is 50 *l.* for the first mans laying in. Likewise take $\frac{1}{3}$ of 100 *l.* for the second mans laying in, which is 33 *l.* $\frac{1}{3}$. Then add 50 *l.* and 33 *l.* $\frac{1}{3}$ together, and you shall have 83 *l.* $\frac{1}{3}$ for your common Divisor: then multiply 91 *l.* by 50, and divide by 83 $\frac{1}{3}$, and thereof cometh 54 *l.* $\frac{3}{5}$ to which Number add 5, and all is 59 *l.* $\frac{3}{5}$ for the first mans part of the Gain. Likewise multiply 91 by 33 $\frac{1}{3}$, and divide by 83 $\frac{1}{3}$, and you shall find 36 *l.* $\frac{2}{5}$ to which add 4, and you shall have 40 *l.* $\frac{2}{5}$ for the second mans part.

12 Two Merchants have gained 100 *l.* The first must have the $\frac{1}{2}$ less by 4 *l.* The second must have $\frac{1}{3}$ less by 2 *l.* I demand how much each of them shall have?

Answ. Add 4 and 2 with 100, and they make 106. Then take as before is said 50 *l.* for the first man, and 33 $\frac{1}{3}$ for the second, and add them both together, and they be 83 $\frac{1}{3}$ which shall be your Divisor: then multiply 106 by 50, and divide the Product by 83 *l.* $\frac{1}{3}$, so thereof cometh 63 *l.* $\frac{3}{5}$. From which abate the 4 *l.* less, that the first man taketh, and then is there remaining 59 *l.* $\frac{3}{5}$ for his part: Likewise multiply 106 by 33 $\frac{1}{3}$, and divide by 83 $\frac{1}{3}$, and you shall find 42 *l.* $\frac{2}{5}$, from which abate 2 *l.* less, and there remaineth 40 *l.* $\frac{2}{5}$ for the second mans part.

CHAP. X.

Of the Rule of Fellowship, with Time.

THE money that every man layeth in, must be multiplied by the time that it continueth in company, and of that which cometh thereof you shall make their new layings in for each of them; and then multiply the Gain by every one of them severally, and the Products you shall divide by all their new layings in added together, and then you shall have proportionally, each mans part of the gain according to his laying in.

Example.

1 Two Merchants have companied together: The first hath put in the first of *January* 450 *l.* The second did lay in the first of *May* 750 *l.* And at the years end, they had gained 100 *l.* I demand how much each of them shall have of the Gain?

Answ. For as much as the first did put 450 *l.* the first of *January*, his money continued in company 12 moneths, and therefore multiply 450 by 12 moneths, and thereof cometh 5400 for his new laying in: and the second laid in his 750 *l.* but at the first day of *May*, so that his

his money remained in Company but 8 moneths. Then say by the Rule of Three,

1 *As* 11400 *to* 100 l. : : *So* 5400 *to* 47 *l.* $\frac{7}{19}$. for the first mans share.

2 *As* 11400 *to* 100 l. : : *So* 6000 *to* 52 l. $\frac{12}{19}$. for the second mans share.

2 Two Merchants have companied together, the first hath laid in the first of *January* 640 *l.* The second can lay in nothing until the first of *April*: I demand how much he shall then lay in, to the end that he may take half the Gain?

Answ. Multiply 640 *l.* by 12 moneths, that his money abideth in company, and thereof will come 7680 *l.* for his laying in; and so much ought the second man to lay in, because he taketh $\frac{1}{2}$ of the Gain. But because he putteth in nothing until the first of *April*, his money can be in Company no longer than 9 moneths; and therefore divide 7680 by 9, and thereof will come 853 *l.* $\frac{1}{3}$, so much therefore ought the second Merchant to lay in the first of *April*, to the end that he may take the one half of the Gains.

3 Three Merchants have companied together. The first hath laid in the first of *March* 100 *l.* the second laid in the first of *June* so much money, that of the Gain, he must have the $\frac{1}{3}$ part, and the third laid in the first of *November* so much money, that of the Gain he must have likewise $\frac{1}{3}$, and they continued in company until the next *March* following: I demand

mand how much the ſecond and the third Merchants did lay in?

Anſw. Multiply 100 *l.* which the firſt man did lay in by 12 moneths, that his money continued in company, and thereof cometh 1200 for his laying in, and ſo much ought the ſecond and third Merchants each of them to lay in, becauſe they part the Gains equally by thirds; But becauſe the ſecond Merchant layeth in nothing till the firſt of *June*, his money can be in company but 9 moneths; therefore divide 1200 by 9 moneths, and thereof will come $133\frac{1}{3}$, and ſo much ought the ſecond Merchant to lay in; Then foraſmuch as the third Merchant did lay in nothing till the firſt of *November*, his money abideth in company but the ſpace of 4 moneths: therefore divide 1200 by 4, and thereof cometh 300 *l.* and ſo much ought the third Merchant to lay into company.

4 Three Merchants have companied together; the firſt laid in the firſt of *January*, 100 Ducates; the ſecond hath laid in 50 *l.* the firſt of *March*; and the third put in a Jewel the firſt of *July*, and at the years end they had gained 400 Crowns: of which the firſt Merchant muſt have 50 Crowns, and the ſecond muſt have 80, I demand what the Ducate was worth, and at what Price the Jewel was valued, which the third Merchant laid in?

Anſw. The firſt mans money being 100 Ducates multiplied by 12 is 1200 Ducates by the Rule aforeſaid, and he taketh 50 Crowns for the Gain, therefore ſay, If 50 Crowns Gain come of 1200, which was his Stock, of how

how much shall come 80 Crowns Gain, that the second man taketh? Multiply and divide, and you shall find 1920 for the second mans laying in. Then say again, If 50 Crowns come of 1200 Stock, of how much shall come 2700 Crowns, which the third man taketh of the Gain. Multiply and divide and you shall find 6480 for the third mans laying in; Then divide 1920 which is the second mans laying in, by 10 moneths, that his money did continue in company, and you shall find 192 Ducates which are worth 50 *l.* because he laid in 50 *l.* Then divide 50 *l.* (being first reduced into shillings, by the said 192 Ducates) and thereof will come 5 *s.* 2 *d.* $\frac{1}{2}$. So much was the Ducate worth: Finally, divide 6408 (which is the third mans laying in) by 6 moneths that his Jewel remained in company, and you shall find 1080 Ducates, and for that Price was the Jewel put into company.

5 Three Merchants have companied together, The first hath laid in the first of *January* 100 *l.* and the first of *April* he hath taken back again 20 *l.* The second hath laid in the first of *March* 60 *l.* and afterward he did lay in more 100 *l.* the first of *August*. The third laid in the first of *July* 150 *l.* and the first of *October*, he took back again 50 *l.* and at the years end they found that they had gained 160 pounds, I demand how much every man shall have of the Gain?

Answ. Multiply 100 *l.* which the first man laid in by 12 moneths, and thereof cometh 1200 *l.* from that Number abate 9 times 20 *l.* which

which are 180, for that which he took back again, and there will remain 1020, for the first mans laying in: Then multiply 60 which the second man laid in by 10, and you shall have 600; to which add 5 times 100 *l.* for the money he laid in more the first of *August*, which are 500, so all amounteth to 1100 for the second mans laying in. Afterwards multiply 150 *l.* which the third man hath laid in by 6 moneths, and thereof cometh 900, from which Number abate 3 times 50, and they are 150 for the money that he took back again the first of *October*, so there will remain 750, for the third mans laying in. Then proceed with the rest, as is taught in the first Question of the Rule of Fellowship with time, in adding 1020, 1100, and 750 all together, which shall be your Divisor.

Then by the Rule of Three, for the first Merchant.

As 2870 *to* 160 l. :: *So* 1020 *to* 56 l. $\frac{248}{287}$.

for the second Merchant.

As 2870 *to* 160 l. :: *So* 1100 *to* 61 l. $\frac{93}{287}$.

for the third Merchant.

As 2870 *to* 160 l. :: *So* 750 *to* 41 l. $\frac{233}{287}$.

6 Two Merchants have companied together, The first hath laid in 960 *l.* for the space of 12 moneths, and he ought to have 8 *l.* upon the 100 *l.* of the Gain. The second hath laid in 1120 *l.* for the space of 8 moneths, and he ought to have after 12 *l.* upon the 100 *l.* of the Gain; and at the Years end, they have gained

ed 800 *l.* I demand how much each of them ſhall have of the Gain?

Anſw. Multiply 960 that the firſt man laid in by 12 moneths, and the Product thereof multiply again by 8, and you ſhall have 92160, for the firſt mans laying in; then multiply the 1120, that the ſecond hath laid in by 8 moneths, and that which cometh thereof, you ſhall multiply again by 12, and you ſhall find 107520, for the ſecond mans laying in.

Then, as before, add theſe two Sums together, 92160, and 107520, and they make 199680. Then work by the Rule of Three.

1 *As* 199680 *to* 800 l. :: *So* 92160 *to* 369 l. $\frac{3}{13}$.
for the firſt mans ſhare.

2 *As* 199680 *to* 800 l. :: *So* 107520 *to* 430 $\frac{10}{13}$.
for the ſecond mans ſhare.

CHAP. XI.

Of the Rule of Company between Merchants and their Factors.

NOte, that the Eſtimation of the Body, or Perſon of a Factor, is in ſuch proportion to the Stock, which the Merchant layeth in, as the Gain of the ſaid Factor is unto the Gain of the Merchant. As firſt, If a Merchant do deliver into the hands of his Factor

Factor 200 *l.* to imploy, and he to have half the Profit, the Person of the said Factor shall be esteemed to be worth 200 *l.*

2 If the Factor take but the $\frac{1}{3}$ of the Gain, he then hath but $\frac{1}{2}$ so much of the Gain as the Merchant taketh, which hath $\frac{2}{3}$: wherefore the Person of the Factor is esteemed but the $\frac{1}{2}$ of that which the Merchant layeth in, that is to say 100 *l.*

3 If the Factor did take the $\frac{2}{5}$ of the Gain, then the Merchant shall take the residue, which are $\frac{3}{5}$ of the Gain: wherefore the Gain of the Merchant to that of the Factor, is in such proportion as 3 unto 2. Then if you will know the Estimation of the Person of the Factor; say, If 3 give me 2, what will 200 give? multiply 200 by 2, and divide by 3, so you shall find 133 $\frac{1}{3}$, or otherwise, you must consider that the Factor taketh the $\frac{2}{3}$ of that which the Merchant taketh. And therefore take the $\frac{2}{3}$ of 200, and you shall find 133 $\frac{1}{3}$ as before, and so much is the Person of the Factor esteemed to be worth.

4 If the Merchant should deliver unto his Factor 200 *l.* and the Factor would lay in 40 *l.* and his Person to the end he might have the half of the Gain: I demand for how much shall his Person be esteemed?

Answ. Abate 40 *l.* from 200 *l.* and there will remain 160 *l.* and at so much shall his Person be esteemed.

5 If the Factor would take the $\frac{2}{3}$ of the Gain, his Person with his 40 *l.* shall be esteemed twice as much as the Stock that the Merchant layeth in, which

which ſhould have but $\frac{1}{3}$ of the Gain, for $\frac{2}{3}$ unto $\frac{1}{3}$ is in double proportion. Therefore double 200 *l.* and thereof cometh 400 *l.* from which abate 40 *l.* there will remain 360 *l.* But if the Factor would take only the $\frac{1}{3}$ of the Gain, that ſhall be but the $\frac{1}{2}$ of $\frac{2}{3}$ which the Merchant taketh; and then the Eſtimation of his Perſon with his laying in ſhould be eſteemed but the half of that which the Merchant layeth in: you muſt therefore take the $\frac{1}{2}$ of 200 *l.* which is 100 *l.* from which you ſhall abate 40 *l.* and the reſt which is 60 *l.* is the Eſtimation of his Perſon.

6 If it ſo chance for to make Traffick of 240 *l.* that the Perſon of the Factor ſhould be in ſuch wiſe eſteemed, that he ſhould have but the $\frac{1}{4}$ of the Gain, and yet he would have the $\frac{1}{2}$: I demand how much ready money he ought to lay in beſide his Perſon?

Anſw. Seeing that his Perſon gaineth the $\frac{1}{4}$, therefore all the whole laying in, which is 240 *l.* ſhall gain the reſt, that is to ſay, the $\frac{3}{4}$; now becauſe $\frac{1}{4}$ is the $\frac{1}{3}$ of $\frac{3}{4}$, therefore his Perſon ſhall be eſteemed the $\frac{1}{3}$ of all the laying in, take then the $\frac{1}{3}$ of 240 *l.* and you ſhall have 80 *l.* for the Eſtimation of his Perſon, and becauſe that he will have half of the Gain, you ſhall add 80 *l.* with 240 *l.* and thereof cometh 320 *l.* of which take the half, which is 160 *l.* and from the ſame you ſhall abate the 80 *l.* and there will remain other 80 *l.* which he ought to lay in of ready money, and the Merchant muſt lay in the over-plus, which amounteth to 160 *l.*

7 A Merchant hath delivered to the Factor 1200 *l.* to govern it in the Trade of Merchandize, upon ſuch condition, that he for his ſervice ſhall have the $\frac{1}{3}$ of the Gain, if any thing be gained, and he ſhall bear the $\frac{1}{3}$ of the Loſs, if any thing be loſt; I demand for how much his Perſon was eſteemed?

Anſw. Seeing that the Factor taketh the $\frac{1}{3}$ of the Gain, his Perſon ought to be eſteemed as much as $\frac{1}{2}$ of the Stock, which the Merchant layeth in, that is to ſay, the $\frac{1}{2}$ of 1200 which is 600 *l.* The reaſon is, becauſe the $\frac{1}{3}$ of the Gain that the Factor taketh, is the $\frac{1}{2}$ of the $\frac{2}{3}$ of the Gain that the Merchant taketh: And ſo the Factor his Perſon is eſteemed to be worth 600 *l.*

8 A Merchant hath delivered to his Factor 1200 *l.* and the Factor layeth in 500 *l.* and his Perſon: Now becauſe he layeth in 500 *l.* and his Perſon, it is agreed between them, that he ſhall take $\frac{2}{5}$ of the Gain: I demand for how much his Perſon was eſteemed?

Anſw. Foraſmuch as the Factor taketh the $\frac{2}{5}$ of the Gain, he taketh the $\frac{2}{3}$ of that which the Merchant taketh, for $\frac{2}{5}$ are the $\frac{2}{3}$ of $\frac{3}{5}$; and therefore the Factors laying in ought to be 800 *l.* which is the $\frac{2}{3}$ of 1200 *l.* that the Merchant laid in. Then abate 500 *l.* which the Factor laid in from 800 *l.* which ſhould be his whole Stock: and there remaineth 300 *l.* for the Eſtimation of his Perſon.

9 *More*, A Merchant hath delivered to his Factor 1000 *l.* upon ſuch condition, that the Factor for his pains and ſervice, ſhall have the

the Gains of 200 *l.* as though he had laid in so much ready money: I demand what portion of the Gain the said Factor shall take?

Answ. Add 200 and 1000 together, and they make 1200, then see what part the 200 *l.* (which the Factor laid in) is of the 1200, which is to be reckoned as the whole Stock of their Company, and you shall find that is the $\frac{1}{6}$; and such part of the Gain shall the Factor take.

But in case, that in making their Covenants, it were agreed between them, that the Factor should have the Gain of 200 *l.* of the whole Stock, which the Merchant layeth in, that is to say, of the 1000 *l.* then should the Factor take the $\frac{1}{5}$ of the Gain, for 200 *l.* is the $\frac{1}{5}$ of 1000.

CHAP. XII.

Of the Rules of Barter, that is to say, to change Ware for Ware, &c.

1 TWO Merchants will change their Merchandize, the one with the other; The one of them hath Cloth of 7 *s.* 1 *d.* the Yard, to sell for ready money, but in Barter he will sell it for 8 *s.* 4 *d.* The other hath Cinnamon of 4 *s.* 7 *d.* the pound to sell for ready money;

I demand how he ſhall ſell it in Barter that he be no loſer?

Anſw. If $7\frac{1}{12}$ require $8\frac{1}{3}$: what $4\frac{7}{12}$? *Anſ.* 5 *s.* 4 *d.* $\frac{12}{17}$; that is, If $7\frac{1}{12}$ (which is the Price that the Yard of Cloth is worth in ready money) be ſold in Barter for $8\frac{1}{3}$, for what ſhall $4\frac{7}{12}$ be ſold in Barter, which $4\frac{7}{12}$ is the price that the pound of Cinnamon is worth in ready money? Reduce the whole Numbers into their broken, and then multiply and divide, and you ſhall find 5 *s.* 4 *d.* $\frac{12}{17}$ parts of a peny, and for ſo much ſhall he ſell the pound of Cinnamon in Barter.

2 Two Merchants will barter their Merchandize the one with the other; The one of them hath Chamblets of 2 *l.* 18 *s.* 4 *d.* the Piece, to ſell for ready money, and in Barter he will ſell the Piece for 4 *l.* 3 *s.* 4 *d.* the other hath fine Caps of 35 *s.* 10 *d.* the Dozen to ſell in Barter: I demand what the Dozen of Caps were worth in ready money?

Anſw. Say, If 4 *l.* 3 *s.* 4 *d.* which is the over-price of the Piece of Chamblet come of 2 *l.* 18 *s.* 4 *d.* which was the juſt price of the ſame, what ſhall come of 35 *s.* 10 *d.* which is the over-price of the Dozen of Caps? multiply and divide, and you ſhall find 25 *s.* 1 *d.* and ſo much are the Dozen of Caps worth in ready money.

3 Two Merchants will change their Merchandize, the one with the other; the one of them hath Fuſtians of 18 *s.* 4 *d.* the Piece, to ſell for ready money, and in Barter he will ſell the Piece for 26 *s.* 8 *d.* The other hath

Tapeſtry

Tapestry of 15 *d.* the Ell to sell for ready money, and in Barter he will sell it for 20 *d.* the Ell; I demand which of them gaineth, and how much upon the 100 *l.* of money?

Answ. Say, If 18 *s.* $\frac{2}{3}$ (which is the just price of the Piece of Fustian) be sold in Barter for 26 *s.* $\frac{2}{3}$, for how much shall 1 *s.* $\frac{1}{4}$ (which is the just Price of the Ell of Tapestry) be sold in Barter? multiply and divide, and you shall find 21 *d.* $\frac{2}{11}$: And he doth over-sell it but for 20 *d.* So that of 21 $\frac{2}{11}$ he maketh but 20 *d.* and therefore say by the Rule of Three, If the second Merchant of 21 $\frac{2}{11}$ make but $\frac{20}{1}$, how much shall he lose in the $\frac{100}{1}$? multiply and divide, and you shall find 91 $\frac{2}{3}$, which being abated from 100, there will remain 8 $\frac{1}{3}$: And after the rate of 8 $\frac{1}{3}$, doth the second Merchant lose in the 100; and consequently, the first Merchant of 20 *d.* maketh 21 *d.* $\frac{2}{11}$, and therefore say again by the Rule of Three, If the first Merchant of $\frac{20}{1}$ doth make 21 $\frac{2}{11}$, how much shall he gain upon $\frac{100}{1}$? multiply and divide, and you shall find 109 *l.* $\frac{1}{11}$; and thus the first Merchant gaineth after the rate of 9 *l.* $\frac{1}{11}$ upon the 100 *l.* of money.

For your better understanding of these Questions, you must note, that when one Merchant gaineth of another after the rate of 10 *l.* upon the 100 *l.* he gaineth the $\frac{1}{10}$ of his own Principal, and the other, which loseth after the rate of 9 $\frac{1}{11}$ in the 100 *l.* he loseth the $\frac{1}{11}$ of his Principal, and it may be proved thus; when one Merchant will sell his Wares to another, which Wares stand him but in 100 *l.* and he Note.

will

will sell them for 110 *l.* therefore he of his 100 *l.* maketh 110 *l.* and so he gaineth after 10 *l.* upon the 100, which is the $\frac{1}{10}$ of his Principal, and the other which buyeth Wares for 110 *l.* that cost the other but 100 *l.* of the 110 *l.* he maketh but 100 *l.* And therefore say by the Rule of Three, If 110 come of 100, how much shall come of 100? Multiply and divide, and you shall find $90\frac{10}{11}$, which abate from 100, and there will remain $9\frac{1}{11}$, which is the $\frac{1}{11}$ of the Principal, that the second loseth in the 100 *l.* as before is said, and therefore whoso will know what one Merchant gaineth of another, either after the rate of 10 *l.* upon the 100 *l.* which is the $\frac{1}{10}$ of his Principal, or else after the rate of 20 *l.* upon the 100 *l.* which is the $\frac{1}{5}$, or of any other part, and would likewise know what part the other loseth of his Principal, he must take for the Numerator of the broken Number of him that loseth, as much as for him that gaineth; then add the Numerator and the Denominator (of the broken Number of him that gaineth) both together, and make thereof the Denominator of the broken Number of him that loseth, and then shall you have the just part of him that loseth.

As by Example, Of him that gaineth after 10 *l.* upon the 100 *l.* which is the $\frac{1}{10}$ of his Principal: take the Numerator of $\frac{1}{10}$ which is 1, and make that the Numerator of the broken Number of him that loseth, then add 1, which is the Numerator of the Fraction of him that gaineth with 10, which is his Denominator, and you shall have 11 for the Denominator of the

the Fraction of him that loseth; then put 1 over the 11, and so you shall have $\frac{1}{11}$: Thus it appeareth when one Merchant gaineth of another after 10 *l.* upon the 100 *l.* he gaineth the $\frac{1}{10}$ of his Principal, and the other loseth $9\frac{1}{11}$ which is the $\frac{1}{11}$ of his Principal, and if he would gain after 20 upon the 100 *l.* which is the $\frac{1}{5}$ of his Principal, the other should lose $16\frac{2}{3}$, which is the $\frac{1}{6}$ of his Principal: And so is to be understood of all other Fractions.

4 Two Merchants will change their Merchandize the one with the other, the one of them hath Says of 20 *s.* and 10 *d.* the piece to sell for ready money; and in Barter he will sell the piece for 23 *s.* 4 *d.* and yet he will gain moreover after 10 *l.* upon the 100 *l.* The other hath Wooll of 50 *s.* the Hundred weight to sell for ready money; I demand how he shall sell the Hundred of Wooll in Barter?

Answ. Say, If 20 *s.* 10 *d.* which is the just price of the piece of Say, be sold in Barter for 23 *s.* 4 *d.* for how much shall 50 *s.* (which is the just price of the Hundred of Wooll) be sold in Barter? Multiply and divide, and you shall find 56 *s.* Then because the first Merchant will gain after 10 *l.* upon the 100 *l.* he maketh of his 100 *l.* 110 *l.* so the second Merchant maketh of 110 *l.* but 100 *l.* and therefore say by the Rule of Three, If the second Merchant of 110 makes but 100, how much shall he make of 56? Multiply and divide, and you shall find 50 *s.* 10 *d.* $\frac{10}{11}$ of a peny, and for so much shall he sell the Hundred of Wooll in Barter.

5 *More*, Two Merchants will change their Merchandize the one with the other, the one hath Taffaty of 16 Crowns the Piece to sell for ready money, and in Barter he will sell the Piece for 20 Crowns, and yet he will gain moreover after the rate of 10 *l.* upon the 100 *l.* The other hath Ginger of 3 *s.* 9 *d.* the pound weight, to sell in Barter: I demand what the pound did cost in ready money?

Answ. Say, If 20 Crowns which is the surprice of the Piece of Taffaty, come of 16 Crowns the just price; how much shall come of 3 *s.* 9 *d.* which is the surprice of the pound of Ginger? Multiply and divide, and you shall find 3 *s.* Then, because the Merchant of Taffaty will gain after 10 upon the 100, say, If 100 give 110, what shall 3 *s.* give? Multiply and divide, and you shall find 3 *s.* 3 *d.* $\frac{3}{5}$, and so much did the pound of Ginger cost in ready money.

6 *More*, Two Merchants will change their Merchandize, the one with the other, the one of them hath Woisteds of 25 *s.* the Piece, to sell for ready money, and in Barter he will sell the Piece for 33 *s.* 4 *d.* and yet he loseth after 10 *l.* in the 100 *l.* the other hath Wax of 3 *l.* 6 *s.* 8 *d.* the Hundred Weight to sell for ready money: I would know for what price he should sell his Wax in Barter?

Answ. Say, If 25 *s.* which is the just price of the Piece of Worsted, be sold in Barter for 33 *s.* 4 *d.* for how much shall 3 *l.* 6 *s.* 8 *d.* be sold, which is the just price of the Hundred of Wax, as it was worth in ready money?

money? Multiply and divide, and you shall find 4 *l.* $\frac{4}{9}$, which is 8 *s.* 10 *d.* $\frac{2}{3}$, then because the Merchant of Worsteds loseth after 10 *l.* in the 100 *l.* of 100 *l.* he maketh but 90, and therefore say, If 90 give 100, what giveth 4 *l.* $\frac{4}{9}$? Multiply and divide, and you shall find 4 *l.* $\frac{76}{81}$ which is worth 18 *s.* 9 *d.* $\frac{5}{27}$, and for so much shall he sell the 100 pound weight of Wax in Barter.

7 *More*, Two Merchants will change their Merchandize the one with the other: the one of them hath Worsteds of 5 *l.* 6 *s.* 8 *d.* the Piece to sell for ready money, and in Barter he will sell the Piece for 6 *l.* 13 *s.* 4 *d.* and yet he loseth after 10 *l.* in the 100; and the other hath Musk of 2 *s.* 9 *d.* $\frac{1}{3}$ the pound weight to sell in Barter: I demand what the pound did cost in ready money?

Answ. Say, If 6 *l.* $\frac{2}{3}$, which is the overprice of the Piece of Worsted, come of 5 *l.* $\frac{1}{3}$, which is the just price of the same, how much shall come of 2 *s.* 9 *d.* $\frac{1}{3}$? Multiply and divide, and you shall find 2 *s.* $\frac{2}{9}$ which $\frac{2}{9}$ are 2 *d.* $\frac{2}{3}$; then because the Merchant of Worsteds loseth after 10 *l.* in the 100 *l.* of 100 he maketh but 90, and therefore say, If 100 give but 90, how much shall 2 *s.* $\frac{2}{9}$ give? Multiply and divide, and you shall find 2 *s.* and so much cost the pound of Musk in ready money.

Other Rules of Barter, wherein is given some part in ready money.

When a Merchant overselleth his Merchandize, and he will have also some part of his over-price in ready money; as the $\frac{1}{2}$ the $\frac{1}{3}$ or the $\frac{1}{4}$ *&c.* he must subtract the same part of money from the just price, and also from the over-price of his Merchandize, and the two Numbers that remain after the Subtraction is made, shall be the two first Numbers in the Rule of Three, and the just price of the second Merchant shall be the third Number, to know how many he shall over-sell the part of his Merchandize.

Example.

8 Two Merchants will change their Merchandize the one with the other, the one of them hath fine Wooll at 5 *l.* the 100 pound weight to sell for ready money, and in Barter he will sell it for 6 *l.* and yet he will have the $\frac{1}{3}$ in ready money. The other hath Cloth of 13 *s.* 4 *d.* the Yard to sell for ready money, I would know how he shall sell the same in Barter?

Answ. Take the $\frac{1}{3}$ of 6 *l.* which is the over-price of the Hundred of Wooll, and that is 2 *l.* which you must abate from 5 *l.* which is the just price of the Hundred of Wooll, and also abate it from 6 *l.* which is the over-price, and there shall rest 3 *l.* and 4 *l.* for the two first

first Numbers in the Rule of Three, then take 13 *s.* 4 *d.* which is the just price of the Yard of Cloth for the third Number. Then multiply and divide, and you shall find 17 *s.* 9 *d.* $\frac{1}{3}$, for so much shall the second sell his Cloth in Barter.

As 3 l. *to* 4 l. :: *So* 13 s. $\frac{1}{3}$ *to* 17 s. 9 *d.* $\frac{1}{3}$.

9 *More*, Two Merchants will change their Merchandize the one with the other, the one of them hath Wax of 3 *l.* 6 *s.* 8 *d.* the Hundred to sell for ready money, and in Barter he will sell the same for 4 *l.* 3 *s.* 4 *d.* and yet he will have the $\frac{1}{4}$ in ready money. And the other hath fine Crimson Satten of 15 *s.* the Yard, to sell in Barter: I demand what it is worth in ready money?

Answ. Take the $\frac{1}{4}$ of 4 *l.* 3 *s.* 4 *d.* which is 1 *l.* 0 *s.* 10 *d.* and abate it from 4 *l.* 3 *s.* 4 *d.* and also from 3 *l.* 6 *s.* 8 *d.* and there resteth 3 *l.* 2 *s.* 6 *d.* and 2 *l.* 5 *s.* 10 *d.* for the two first Numbers in the Rule of Three; and 15 *s.* for the third Number, which 15 *s.* is the over-price of the Yard of Satten. Then multiply and divide, and you shall find 11 *s.* And so much did the Yard of Satten cost in ready money.

10 Two Merchants will change their Merchandize the one with the other, the one of them hath Tin of 50 *s.* the Hundred weight, to sell for ready money, and in Barter he will sell it for 3 *l.* 6 *s.* 8 *d.* and he will gain after 10 *l.* upon the 100 *l.* and yet he will have also the one half in ready money. The other hath Lead of 3 half-pence the pound to sell for ready

money: I demand how he shall sell the pound of Lead in Barter.

Answ. See first at 10 *l.* upon the 100 *l.* what the 3 *l.* $\frac{1}{3}$ will come to, in saying by the Rule of Three, If 110 give 100, what will 3 $\frac{1}{3}$ give? Multiply and divide, and you shall find that they will come to 3 *l.* $\frac{2}{3}$, which is 13 *s.* 4 *d.* of which the half which he demandeth in ready money, is 36 *s.* 8 *d.* the same being abated from 50 *s.* and also from 3 *l.* 13 *s.* 4 *d.* there will remain 13 *s.* 4 *d.* and 1 *l.* 16 *s.* 8 *d.* for the two first Numbers in the Rule of Three, which you must put all into half-pence, and the foresaid three half-pence, shall be your third Number, and then multiply and divide, and you shall find 4 *d.* $\frac{1}{8}$, and for so much shall he sell the one pound of Lead in Barter.

11 *More,* Two Merchants will change their Merchandize the one with the other: the one of them hath Steel of 16 *s.* 8 *d.* the Hundred Weight, to sell for ready money, and in Barter he will sell it for 25 *s.* and yet he loseth after 10 *l.* in the 100 *l.* but he will have the $\frac{1}{2}$ in ready money: the other hath Iron of 6 *s.* 8 *d.* the Hundred to sell in Barter: I demand what the Hundred of Iron did cost in ready money.

Answ. Say, If 100 come but to 90, how much shall 25 *s.* come to? Multiply and divide, and you shall find 22 *s.* 6 *d.* of which Number take the $\frac{1}{2}$, which is 11 *s.* 3 *d.* and subtract it from 22 *s.* 6 *d.* and also from 16 *s.* 8 *d.* and there will remain 11 *s.* 3 *d.* and 5 *s.* 5 *d.* for the two first Numbers in the Rule of

Three,

Three, and 6 *s.* 8 *d.* which is the over-price of an Hundred of Iron for the third Number. Then multiply and divide, and you shall find 3 *s.* 2 *d.* $\frac{1}{2}$ $\frac{4}{7}$ and so much did the Hundred of Iron cost in ready money.

12 *More,* Two Merchants will change their Merchandize the one with the other: the one of them hath Says of 20 *s.* 10 *d.* the Piece to sell for ready money, and in Barter he will sell the Piece for 25 *s.* and he will have the $\frac{1}{4}$ in ready money. The other hath Caps of 35 *s.* the Dozen, to sell for ready money, but he will gain after the rate of 10 *l.* upon the 100 *l.* I demand how he shall sell a Dozen of Caps in Barter?

Answ. Say, If 100 be worth 110, what shall 35 *s.* be worth, which is the just price of the Dozen of Caps? multiply and divide, and you shall find 38 *s.* 6 *d.* then take $\frac{1}{4}$ of 25 *s.* which is 6 *s.* 3 *d.* and subtract it from 20 *s.* 10 *d.* and also from 25 *s.* and there will remain 14 *s.* 7 *d.* and 18 *s.* 9 *d.* for the two first Numbers in the Rule of Three, and 38 *s.* 6 *d.* which is the just price of his Gain in the Dozen of Caps for the third Number: then multiply and divide, and you shall find 49 *s.* 6 *d.* and for so much he shall sell the Dozen of Caps in Barter.

CHAP. XIII.

Of Exchanging of Money from one Place to another.

THE Value of forein Coins being uncertain, and also the Exchange sometimes higher and lower, these things cannot be determined by Tables, but must be attained by experience; but the Value being known, these Rules will direct you in working your Question at any Value.

First, You must note that at *Antwerp* they use to make their accounts by Deniers *de groß*, that is to say, by pence *Flemish*, whereof 12 do make a shilling *Flemish*, and 20 shillings *Flemish* make 1 *l. de groß*.

Example.

1 If I deliver in *Flanders* 500 l. *Flemish* at 19 *s.* 6 *d. de groß*, that is to say, at 19 *s.* 6 *d. Flemish*, to receive 20 *s.* at *London*; I demand how much I shall receive sterling at *London* for the said 500 l. *Flemish*?

Answ. Say, If $19\frac{1}{2}$ give $\frac{20}{1}$, what will $\frac{500}{1}$ give? multiply and divide, and you shall find 512 *l.* 16 *s.* 4 *d.* $\frac{12}{13}$ of a peny; and so much sterling shall I receive in *London* for my 500 *l. Flemish*.

In

In Decimals, 19,5 : 20 :: 500 : 512,8205
facit 512 *l.* 16 *s.* 5 *d. fere.*

2 If I deliver in *London* 375 *l.* ſterling, to receive in *Antwerp* 21 s. 9 d. *de groſs*, that is to ſay, *Flemiſh*, for every pound ſterling, I demand how many pounds *Flemiſh* I ſhall receive in *Antwerp* for the ſaid 375 pounds ſterling?

Anſw. Say, If $\frac{20}{1}$ give $21\frac{3}{4}$ what will $\frac{375}{1}$ give? multiply and divide, and you ſhall find 407 *l.* 16 *s.* 3 *d.* ſo many pounds *Flemiſh* ſhall I receive at *Antwerp* for the ſaid 375 pounds ſterling.

By Decimals.

20 *s.* : 21,75 :: 375 *l.* : 407 *l.* 8125
375 *which is* 407 l. 16 s. 3 d.

3 If I take up money at *Antwerp* after 19 *s.* 6 *d.* *Flemiſh*, to pay for the ſame at *London* 20 *s.* ſterling, and when the day of paiment is come, I am forced to return the ſame, and to take up money again in *London* to pay my Bill of Exchange, ſo that for 20 *s.* which I take up here, I muſt pay 19 *s.* 9 *d.* at *Antwerp*, I demand whether I do win or loſe, and how much in or upon the 100 *l.* of money.

Anſw. Say, If $19\frac{3}{4}$ give $19\frac{1}{2}$, what will $\frac{100}{1}$ give? multiply and divide, and you ſhall find $98\frac{58}{79}$, which being abated from 100, there will remain $1\frac{21}{79}$. And ſo much do I loſe upon the 100 *l.* of money.

You

You may do this as the former by Decimals, or reduce it into pence thus,

19 *s.* 6 *d.*	19 *s.* 9 *d.*	::	100 *l.*
12	12		
234	237		
	100		
	23700		

23700.0000(98 *l.* 7342 *which is* 98 l. 14 s. 8 d. $\frac{1}{4}$ *fere.*
234

4 If I take up at *London* 20 *s.* sterling to pay at *Antwerp* 21 *s.* 8 *d.* *Flemish*; and when the day of paiment is come, my Factor is constrained to take up money again at *Antwerp*, wherewith to pay the foresaid Sum: and there he doth receive 22 s. *Flemish*, for which I must pay 20 *s.* at *London*. Now I demand whether I do win or lose, and how much upon the 100 *l.* of money after the rate?

Answ. Say, If 21 $\frac{2}{3}$ give $\frac{22}{1}$, what will $\frac{100}{1}$ give? multiply and divide, and you shall find 101 $\frac{7}{13}$ from which abate 100, and there will remain 1 $\frac{7}{13}$, and so much shall I gain upon the 100 *l.* of money.

You may work this either by Decimals or in pence as before.

The Exchange from *London* into *France*, is not like as it is in *Flanders*, but is delivered by the *French* Crown, which is worth 50 Sous *Tournois* the Piece.

And here must you note, that in *France* they make

make their account by Deniers *Tournois*, whereof 12 Deniers make 1 Sous *Tournois*, and 20 Sous *Tournois* make 1 pound *Tournois*, which they call a Livre or Franc, and the *French* Crown is current among Merchants for 51 Sous *Tournois*, but by Exchange it is otherwise, for they will deliver but 50 Sous *Tournois*, which is 2 *l.* 10 Sous *Tournois* for a Crown, and at such price the Crown, as the Taker up of money can agree with the Deliverer.

Example.

5 If I deliver 340 *l.* sterling here in *London* after 6 *s.* 4 *d.* sterling the Crown, to receive at *Roan* or at *Paris* 50 Sous *Tournois* for every Crown, I would know how many Livres *Tournois* I shall receive there for my 340 *l.* sterling?

Answ. Say, If 6 *s.* $\frac{1}{3}$ sterling give me 2 *l.* 10 Sous *Tournois*, what will $\frac{6800}{1}$ *s.* give? (which is the 340 *l.* reduced into shillings) Then multiply and divide, and you shall find 2684 Livres $\frac{4}{19}$ which is worth 4 Sous $\frac{4}{19}$ *Tournois*, and so much shall I receive in *Roan* or *Paris* for my 340 *l.* sterling.

6 If I deliver in *Paris* or *Roan*, or elsewhere in *France*, 1250 Livres *Tournois*, at 50 Sous *Tournois* the Crown, to receive for every such Crown 6 *s.* 3 *d.* sterling in *London*, I demand how much sterling money I shall receive at *London* for my 1250 *l.* *Tournois*?

Answ. Say, If 2 *l.* $\frac{1}{2}$ do give me 6 *s.* $\frac{1}{4}$, what will $\frac{1250}{1}$ give? Multiply and divide, and you shall

shall find 3125 *s.* sterling, which maketh 156 *l.* 5 *s.* sterling: and so many pounds shall I receive at *London* for the said 1250 Livres *Tournois*, after 6 *s.* 3 *d.* for every Crown of 50 Sous.

CHAP. XIV.

Of the Rule of Alligation or Mixture.

THE Rule of Alligation is so named, for that it teacheth to alligate or bind together divers Parcels of sundry prices, and to know how much you shall take of every parcel, according to the Numbers of the Question, which Rule is distinct into two parts as followeth.

The first part of the Rule of Alligation sheweth how to make a Mixture of divers things being of sundry prices; and of the same thing so mixed to know the common price of the said Mixture.

Examples.

1 A Man would mix 5 Bushels of Wheat at 2 *s.* 8 *d.* the Bushel with 9 Bushels of Rie at 2 *s.* the Bushel, and would know how much the Bushel so mixed doth stand him in, the one with the other?

Answ.

Answ. To know the ſame common price, you muſt multiply every thing by his price, and add all the Products together; which you muſt divide by the Number of all the things that are to be mixed, and the Quotient will anſwer to the Queſtion, as in the aforeſaid Example, I multiply 5 Buſhels by its price, that is to ſay, by 2 *s.* 8 *d.* and thereof cometh 13 *s.* 4 *d.* Likewiſe I multiply 9 Buſhels by 2 *s.* and it maketh 18 *s.* both theſe Sums added together, make 31 *s.* 4 *d.* which I reduce into pence, and they make 376 *d.* Then I divide 376 by 14, which is the Number of all the Buſhels, and my Quotient will be 26 *d.* and $\frac{6}{7}$, and ſo much doth one Buſhel of both the ſorts of Grain ſtand him in.

2 If you have two ſeveral things, whereof you would mix equal portions together, you muſt add their prices and take only the $\frac{1}{2}$: if you would mix together equal portions of three things, you muſt take $\frac{1}{3}$: and of four the $\frac{1}{4}$, and ſo continuing.

As by Example, Wheat of 2 *s.* 8 *d.* the Buſhel, and Rie of 2 *s.* the Buſhel, being mingled by equal proportions, I add 2 *s.* 8 *d.* and 2 *s.* together, and they make 4 *s.* 8 *d.* whereof the $\frac{1}{2}$ is 2 *s.* 4 *d.* and ſo much is the value of one Buſhel of ſuch a mixture. And if there were a portion of Barley at 20 *d.* then I muſt add 2 *s.* 8 *d.* 2 *s.* and 20 *d.* together, and they make 6 *s.* 4 *d.* whereof the $\frac{1}{3}$ which is 2 *s.* 1 *d.* $\frac{1}{3}$ ſhould be the price of one Buſhel of that mixture.

3 A Merchant hath 27 pound weight of large

Cloves

Cloves at 6 *s.* the pound, 15 pound of the middle sort at 2 *s.* 6 *d.* the pound, and 10 pound of Fust at 2 *s.* 2 *d.* the pound; when all the same are mixed together, I would know how much the pound is worth?

Answ. You must multiply every Drug by his price, and then divide the total Sum of the Products by the whole weight of the Drugs, and you shall find 4 *s.* 3 *d.* $\frac{1}{26}$, and so much is the pound of that mixture worth.

27 *l.* at	6 *s.* 0 *d.*	162 *s.*	
15 at	2 *s.* 6 *d.*	$37\frac{1}{2}$	$221\frac{1}{6}$ (
10 at	2 *s.* 2 *d.*	$21\frac{2}{3}$	52
52 *l.*		$221\frac{1}{6}$	

And if you would mix $\frac{1}{2}$ large Cloves, $\frac{1}{3}$ of middle, and $\frac{1}{4}$ of Fust, and you would know how much the pound weight were worth; you must take a Number which containeth those parts; as for example 12, whereof the $\frac{1}{2}$ which is 6, shall signifie so many pounds of large Cloves, the $\frac{1}{3}$ which is 4, shall be so many pounds of the middle, and $\frac{1}{4}$ which is 3, shall be so many pounds of Fust. Then afterwards you must multiply every Drug by his price, and divide the total Sum of all the Products, by the whole Sum of the Drugs, and you shall find 4 *s.* $\frac{1}{26}$: And so much is 1 pound weight of that mixture.

6 *l.*

6 *l.*	*at*	6 *s.* 0 *d.*	36 *s.*	
4	*at*	2 *s.* 6 *d.*	10	$52\frac{1}{2}$ ($4\frac{1}{26}$
3	*at*	2 *s.* 2 *d.*	$6\frac{1}{2}$	13
13 *l.*			$52\frac{1}{2}$	

5 And if you would make 100 pound weight of ſuch a mixture, or of ſuch a price, you ſhall work by the Rule of Company, and you ſhall find 46 *l.* $\frac{2}{13}$ of large Cloves, 30 *l.* $\frac{10}{13}$ of middle, and 23 $\frac{1}{13}$ of Fuſt.

If 13 *l.* must be made 100 *l.* what muſt 6 *l.*? 4 *l.*? 3 *l.*? *Anſ.* $46\frac{2}{13}$, $30\frac{10}{13}$, $23\frac{1}{13}$

6 A Goldſmith hath 6 pound weight of ſilver Bullion of 7 ounces fine, more 15 *li* of 8 ounces ½ fine, and 13 pound weight of 10 ounces fine, and he will melt all theſe together, and make of them one Maſs. The Queſtion is to know of what fineneſs the pound weight is?

Anſw. You muſt multiply the Number of the weights of every Bullion by his fineneſs, and thereof will come the ounces and parts of ounces fine, which you muſt add together, and they will make 313 ounces ½ of fine; the ſame you muſt divide by 36, which is the whole Sum of the pound weight of Bullion, and you ſhall find 8 ounces and $\frac{52}{72}$ remaining, which $\frac{52}{72}$ parts of an ounce is worth 14 peny-weights and 4 Grains, and ſo much is the pound weight of this mixture worth.

8 *l.*

8 *l.*	at 7	ounces	is	56
15	at 8	ounces ½	is	127 ½
13	at 10	ounces	is	130
36				313 ½

And here is to be noted, that the reckoning of the weight of Silver is thus as followeth, that is to ſay,

1 Pound of *Troy* weight maketh 12 Ounces.
1 Ounce is divided into 20 Peny-weights.
1 Peny-weight is divided into 24 Grains.
1 Grain into 20 ſmaller parts, *&c.*

And the Reckoning for Gold is thus,

1 Ounce of fine Gold without any allay, is imagined to be 24 Carates fine.
1 Carate is divided into 4 Grains.
1 Grain is parted into 2 half Grains, or 4 quarters of a Grain, *&c.*
And ſo into other ſmaller parts.

Silver is ſaid to be 10 or 11 ounces fine, when becauſe of ſome allay of other metal put thereto, in the trial thereof it loſeth 1 or 2 ounces in a pound or 12 ounces *Troy*. So that of 12 ounces there remains but 10 or 11 ounces of fine ſilver, and the reſt is Copper to make up the weight, which in the Trial doth ſeparate from it and waſt away. Thus our ſilver Coins are 11 ounces fine, or 11 ounces two peny-weights the fineſt. So Gold is ſaid to be 21, 22, or 23 Carates fine, when an ounce thereof in the refining and trial loſeth 1, 2, or 3 Carates of its weight, ſo that the ounce which ſhould be 24 Carates, yields but

but 21, 22, or 23 Carates, our *English* Gold is 22 Carates fine.

7 A Goldſmith hath three ſorts of Silver Bullion, that is to ſay, 5 pound, 7 ounces, 10 peny-weights, at 7 ounces $\frac{1}{2}$ fine; 12 pounds, 3 ounces, at 6 ounces $\frac{1}{3}$ fine; and 4 *l.* at 9 ounces fine, all which he will melt into one Maſs: The Queſtion is to know of what fineneſs the pound weight of that mixture ſhall be?

Anſw. You muſt multiply every Bullion by his fineneſs, as before; and add together all the Products, and they amount to 155 *l.* $\frac{37}{48}$: Then add all the weights of the Bullions together into one Sum, and they make 21 *l.* $\frac{7}{8}$, divide then 155 *l.* $\frac{37}{48}$. by 21 $\frac{7}{8}$, and your Quotient will be 7 ounces and $\frac{1016}{8400}$ remaining, which $\frac{1016}{8400}$ being brought into peny-weights and Grains, make 2 peny-weights, 10 Grains, $\frac{2}{35}$ of a Grain fine: So you may perceive that the ſame mixture is of 7 ounces, 2 *d.* 10 Grains, and $\frac{2}{35}$ of a Grain fine the pound weight.

8 But if the ſaid Goldſmith would put 5 pound weight of Copper with the ſaid Bullions, and you would know of what fineneſs it is, then you muſt add the ſame 5 *l.* with the 21 *l.* $\frac{7}{8}$, and it maketh 26 $\frac{7}{8}$; Then divide the aforeſaid 155 $\frac{37}{48}$ by 26 *l.* $\frac{7}{8}$, and you ſhall find 5 ounces fine, and $\frac{8216}{10320}$ remaining, which $\frac{8216}{10320}$ is worth 15 peny-weights, 22 Grains and $\frac{6}{43}$: and of that fineneſs will the ſame Maſs be.

9 A Goldſmith hath melted 12 pound weight and 5 ounces of Gold Bullion, being of 18 Carates fine, with 4 pound weight, 4

ounces and $\frac{1}{2}$ at 21 Carates fine: I demand of what finenesſ is 1 pound weight of the ſame Maſs?

Anſw. You muſt multiply the weights (by the Carates fine) of each ſort, and add the Products together, the ſame you muſt divide by the whole Sum of all the weights added together, and your Quotient will ſhew you of what finenesſ the ſame is of, as in the former Example, I multiply 12 pound and 5 ounces by 18 Carates, and thereof cometh 223 Carates $\frac{1}{2}$. Likewiſe I multiply 4 pound weight, 4 ounces $\frac{1}{2}$, by 21 Carates, and thereof cometh 91 Carates $\frac{7}{8}$, theſe two Sums of Carates I add together, and they make 315 Carates $\frac{3}{8}$. Then I add 12 pound weight, 5 ounces, and 4 pound weight, 4 ounces, and $\frac{1}{2}$ together, and they make 16 pound, 9 ounces $\frac{1}{2}$, which 9 ounces $\frac{1}{2}$ are $\frac{19}{24}$ parts of a pound; and therefore I divide $315\frac{3}{8}$ by 16 *l.* $\frac{19}{24}$, and thereof cometh 18 Carates, and $\frac{2520}{3224}$ remaining, which Fraction is 3 Grains, and $\frac{51}{403}$ parts of a Grain, and of that finenesſ is 1 pound weight of the ſaid Maſs.

10 A Goldſmith hath melted 10 pound weight, 7 ounces, and $\frac{3}{8}$ of 20 Carates, and $\frac{1}{3}$ fine; and 8 pound weight, 2 ounces, and $\frac{5}{6}$ parts of 23 Carates fine, with 15 pound weight, 1 ounce of Silver. The Queſtion is of what finenesſ is the pound weight of the ſaid Maſs?

Anſw. You muſt multiply the weight of every ſort of Gold Bullion by his allay, that is to ſay, by his finenesſ, and add all the Products

ducts together, and you shall find 405 $\frac{21}{96}$ Carates, then add the weight of the two sorts of Gold Bullion, with the weight of the Silver together, and thereof will come 33 pound, 11 ounces $\frac{5}{24}$, which 11 ounces $\frac{5}{24}$ is $\frac{269}{288}$ of a pound weight, then divide the said 405 $\frac{21}{96}$ parts by 33 pounds $\frac{269}{288}$, and you shall find 10 Carates $\frac{4225}{263871}$: and of the same fineness shall the pound weight of that Mass of Gold be.

The second Part of the Rule of Alligation.

This teacheth how to mix any thing of several sorts or prices together, in such manner, that you may make them of what price, or what Quantity you please.

Example.

1 A Goldsmith hath four sorts of Gold, the first is worth 30 Crowns the pound weight; the second is worth 36 Crowns; and the third is worth 42 Crowns; and the fourth is worth 45 Crowns; and of these four sorts he will make a mixture, which shall be worth 40 Crowns the pound: I demand how much he must take of every sort?

Answ. First you must set down the Numbers whereof you will make the Alligation (which are 30, 36, 42, and 45) orderly the one under the other, after the same manner as if you would add them together; and the common Number whereunto you will reduce them, you shall set on the left hand, which common Number in

this Example is 40. Then mark which of the ſaid four Numbers are leſſer than that common Number, and which of them be greater, and with a draught of your Pen, evermore link two Numbers together, ſo that the one be leſſer than that common Number, and the other greater than it; for two greater, nor two ſmaller Numbers may not be linked together, for they will be either leſſer or elſe greater than the common Number; but one greater Number and one ſmaller may be ſo mixed, that they will make the common Number; and two greater, or two ſmaller Numbers, can never make the common Number in due order, as hereafter ſhall appear.

After that you have thus linked them, then mark how much each of the leſſer Numbers is ſmaller than the common Number, and that Difference you ſhall ſet againſt the greater Numbers which be linked with thoſe ſmaller, each of them with his match ſtill on the right hand; and likewiſe you muſt ſet the exceſs of the greater Numbers againſt the leſſer, which be combined with them; Then ſhall you add all thoſe Differences into one Sum. So theſe Differences ſhew you how many pounds of each ſort you muſt take, and the Sum thereof ſhews how many pounds in all the Mixture will weigh, being of the deſired fineneſs. The following Example makes it plain.

The

		The several Prices.	*The Differences.*		*Weight of each Price.*
The Common Price or Number.	40	30	5	—	1 *l.* $\frac{3}{7}$
		36	2	—	0 $\frac{4}{7}$
		42	4	—	1 $\frac{1}{7}$
		45	10	—	2 $\frac{6}{7}$
			21		

As 21 *to* 6 :: *So* 5 *to* 1 $\frac{3}{7}$
As 21 *to* 6 :: *So* 2 *to* 0 $\frac{4}{7}$
As 21 *to* 6 :: *So* 4 *to* 1 $\frac{1}{7}$
As 21 *to* 6 :: *So* 10 *to* 2 $\frac{6}{7}$

Here in this former Example, you ſee that I have ſet down the ſeveral prices, which be 30, 36, 42, 45, and have linked together 30 with 45, and 36 with 42; the common price 40, I have ſet on the left ſide, as before is declared; and the Difference of it from every ſeveral price, I have ſet on the right hand, againſt that Sum with which it is linked: So the Difference of 30 from 40 is 10, which I ſet againſt 45, that he is linked withal; and the Difference of 45 above 40 is 5, which I have ſet againſt 30; ſo likewiſe, the Difference of 42 above 40 is 2, that I have ſet againſt 36; and the Difference between 36 and 40 (which is 4) I have ſet againſt 42, then I add theſe four Differences together, 5, 2, 4, 10, and they make 21, which ſhews that there muſt be 5 pound of 30 Crowns fine, 2 pound of 36 Crowns fine, 4 pound of 42 Crowns fine, and 10 pound of 45 Crowns fine, which make in all 21 pound weight, and ſo each pound of the ſaid

this Example is 40. Then mark which of the said four Numbers are lesser than that common Number, and which of them be greater, and with a draught of your Pen, evermore link two Numbers together, so that the one be lesser than that common Number, and the other greater than it; for two greater, nor two smaller Numbers may not be linked together, for they will be either lesser or else greater than the common Number; but one greater Number and one smaller may be so mixed, that they will make the common Number; and two greater, or two smaller Numbers, can never make the common Number in due order, as hereafter shall appear.

After that you have thus linked them, then mark how much each of the lesser Numbers is smaller than the common Number, and that Difference you shall set against the greater Numbers which be linked with those smaller, each of them with his match still on the right hand; and likewise you must set the excess of the greater Numbers against the lesser, which be combined with them; Then shall you add all those Differences into one Sum. So these Differences shew you how many pounds of each sort you must take, and the Sum thereof shews how many pounds in all the Mixture will weigh, being of the desired fineness. The following Example makes it plain.

The

		The several Prices.	*The Differences.*	*Weight of each Price.*
The Common Price or Number.	40	30	5	1 *l.* $\frac{1}{7}$
		36	2	0 $\frac{4}{7}$
		42	4	1 $\frac{1}{7}$
		45	10	2 $\frac{6}{7}$
			21	

As 21 *to* 6 :: *So* 5 *to* 1 $\frac{1}{7}$
As 21 *to* 6 :: *So* 2 *to* 0 $\frac{4}{7}$
As 21 *to* 6 :: *So* 4 *to* 1 $\frac{1}{7}$
As 21 *to* 6 :: *So* 10 *to* 2 $\frac{6}{7}$

Here in this former Example, you see that I have set down the several prices, which be 30, 36, 42, 45, and have linked together 30 with 45, and 36 with 42; the common price 40, I have set on the left side, as before is declared; and the Difference of it from every several price, I have set on the right hand, against that Sum with which it is linked: So the Difference of 30 from 40 is 10, which I set against 45, that he is linked withal; and the Difference of 45 above 40 is 5, which I have set against 30; so likewise, the Difference of 42 above 40 is 2, that I have set against 36; and the Difference between 36 and 40 (which is 4) I have set against 42, then I add these four Differences together, 5, 2, 4, 10, and they make 21, which shews that there must be 5 pound of 30 Crowns fine, 2 pound of 36 Crowns fine, 4 pound of 42 Crowns fine, and 10 pound of 45 Crowns fine, which make in all 21 pound weight, and so each pound of the said

said Mixture shall be 40 Crowns fine as was desired. For Proof hereof if you cast it up.

5 *l.* of 30	Crowns fine is	150 *Cr.*
2 *l.* of 36		072
4 *l.* of 42		168
10 *l.* of 45		450

So this 21 *l.* is in all 840

21

And so likewise 21 pound of 40 Crowns fine comes to 40

840 *Cr.*

But now in the second place, if you are confined to make your Mixture of a certain weight in pounds, as well as of a certain finenes: As suppose a Goldsmith would make a Scepter, or Crown, or any Vessel of Gold of this fineness, whose weight should be just 6 pound, and would know how much of each of these sorts he should take?

Having set down the Proposition and wrought the first part of the Alligation as before, he must proceed by the Rule of Three after this manner.

First add the several Differences together, namely, 5, 2, 4, and 10, which make 21, and make that the first Number in the Rule of Three; and 6 pound, which is the weight of the Scepter of Gold, the second Number; and the third Number shall be every particular Difference, for every several working. Then work by the Rule of Three, saying, If 21 (which

is

is all the Differences added together) do give me 6 pound weight, which is the weight of the Scepter, what shall 5 give, which is the first Difference? I multiply and divide, and I find one pound weight $\frac{1}{7}$, so much must I have of the first price. Then I do in like manner with the rest, and I find $\frac{4}{7}$ of a pound weight of the second price, 1 pound $\frac{1}{7}$ of the third price: and 2 pound $\frac{6}{7}$ of the fourth, which 4 Sums being added together, do make 6 *l.* which is the whole weight of the Scepter that I would have. And now to prove if the pieces do agree, you shall do thus, First multiply this total Sum 6, by the common price 40, and it will make 240 Crowns, which you shall keep by it self; and afterward multiply every several Sum of weight by the price belonging to the same weight, and if that Sum do agree with the first that you kept by it self, then is your work well done, as here 1 *l.* $\frac{1}{7}$ is the weight of the sort of Gold, which is of 30 Crowns price: Therefore multiply 30 by 1 *l.* $\frac{1}{7}$, and it maketh 42 Crowns $\frac{6}{7}$, which you must set down; Then multiply $\frac{4}{7}$, (which is the weight of the second sort of Gold) by 36, which is the price of the same, and thereof cometh 20 Crowns $\frac{4}{7}$, so again 1 *l.* $\frac{1}{7}$ multiplied by 42 Crowns, which is the third price, doth make 48 Crowns; and last of all 2 *l.* $\frac{6}{7}$ multiplied by 45 maketh 128 Crowns $\frac{4}{7}$, all these being added together, make 240 Crowns, agreeable to the former Sum of 40, multiplied by 6, and thus I may affirm that this work is well done.

1 *l.* $\frac{1}{7}$	30		42 *Cr.*	$\frac{6}{7}$
0 $\frac{4}{7}$	36	*Crowns fine, comes to*	20	$\frac{4}{7}$
1 $\frac{1}{7}$	42		48	0
2 $\frac{6}{7}$	45		128	$\frac{4}{7}$
			240	

2 A Taverner hath 4 sorts of Wine of 4 several prices, the first of 8 *d.* the Gallon, the second of 10 *d.* the Gallon, the third of 15 *d.* and the fourth of 18 *d.* and he will mix all these sorts together, so that the Gallon shall be worth but 12 *d.* I demand how many Gallons he must take of every sort?

Answ. First, set down the common price desired, which is 12 *d.* then the four several prices of the Wines 8 *d.* 10 *d.* 15 *d.* 18 *d.* and joyn two and two together, as before, and find their Differences from the common price 12 *d.* which shews the several Gallons to be taken of each sort, and being added together make 15 Gallons, and these 15 Gallons come to 15 *s.* that is just 12 *d.* a Gallon. As you may see by the work.

	Price.	*Differ.*	*Price.*
12 *d.*	8 *d.*	3	2 *s.* 0 *d.*
	10	6	5 0
	15	4	5 0
	18	2	3 0
	Gallons	15	*shil.* 15 0

But

But now suppose the Puncheon or Vessel to be filled with the Wine at this price, contains 84 Gallons, how many Gallons of each sort must be taken to fill it?

Work by the Rule of Three, and you shall find how much of every sort.

As 15 *to* 84 : *So* 3 *to* 16 *Gal.* $\frac{4}{5}$ *of the first sort.*
As 15 *to* 84 : *So* 6 *to* 33 $\frac{3}{5}$ *of the second sort.*
As 15 *to* 84 : *So* 4 *to* 22 $\frac{2}{5}$ *of the third sort.*
As 15 *to* 84 : *So* 2 *to* 11 $\frac{1}{5}$ *of the fourth sort.*

In all 84 0

3 A Mint-master hath 4 sorts of Silver Bullion of these finenesses following. The first is of 3 ounces fine, the second of 5 ounces fine, the third of 8 ounces fine, and the fourth of 10 ounces fine: and of all these 4 sorts he would make another sort, that should be but of 6 ounces fine. The Question is, to know what Portion he must take of every of the said Bullions?

Answ. Set down the particular fineness, the one under the other, namely, 3, 5, 8, and 10, and set 6, which is the common fineness, before them toward your left hand, as here you may see.

	3	4
6	5	2
	8	1
	10	3

Then put the Difference of 3 from 6 right against 10, and the Difference of 6 from 10, which is 4, right against 3, likewise the Difference of 5 from 6 which is 1, right against 8, and the Difference of 6 from 8, which

which is 2, right againſt 5; This done, you ſhall conclude, that for every 4 pound weight that he taketh of the Bullion of 3 ounces fine, he muſt take 2 pound of the Bullion of 5 ounces fine, and 1 pound weight of the Bullion of 8 ounces fine, and 3 pound weight of that which is of 10 ounces fine: Or elſe if you pleaſe, add 4, 2, 1, and 3 together, and they make 10, which ſhall be the Denominator of every of the portions, that is to ſay, you ſhall take $\frac{4}{10}$ of the Bullion of 3 ounces fine, $\frac{2}{10}$ of that which is of 5 ounces fine, $\frac{1}{10}$ of that which is of 8 ounces fine, and $\frac{3}{10}$ of that which is of 10 ounces fine, and ſo of all ſuch like. And if you would make 60 pound weight of ſuch a mixture, you muſt add 4, 2, 1, and 3 together, which maketh 10, and then work by the Rule of Company, ſaying, If 10 *l.* give 60 *l.* what will 4 give? and ſo likewiſe what will 2 give? *&c.*

This Form may be varied by combining the particular Values after this manner, as here you ſee, and as in the other Example it is plain.

$$6\left\{\begin{array}{ll}3 & 2\\ 5 & 4\\ 8 & 3\\ 10 & 1\end{array}\right.$$

4 Sometimes the Value doth change his Difference, and is linked unto divers, as when the Number of the ſeveral values are odd, as 3, 5, 7, or when there be more prices above or under the common Value, than to match on the other ſide, then you muſt link two or three to one; as in this Example.

A Merchant hath Wheat of 2 *s.* 8 *d.* the Buſhel, Rie of 2 *s.* and Barley of 16 *d.* the Buſhel, and he will make a mixture of theſe

ſorts,

ſorts, which ſhall ſtand him but in 22 *d.* the Buſhel: It is demanded how much he may take of every ſort of the ſaid Grain?

Anſw. Put the Difference of 22 from 32 and 24 right againſt the 16, and likewiſe the Difference of 16 from 22 right againſt 32, and againſt 24, and you ſhall find for 6 Buſhels that he taketh of Wheat he muſt take 6 Buſhels of Rie, and 12 Buſhels of Barley.

22	32	6 Buſhels	Wheat.
	24	6	Rie.
	16	10 and 2 or 12	Barley.

5 A Mint-maſter hath Bullion of 9 ounces 10 peny-weights fine, and of the ſame he would make money, which ſhould be but of 6 ounces fine, and therefore it behoveth him to melt Copper therewith, which is valued at 0 peny-weight of fine. The Queſtion is to know how much Silver and Copper he muſt mix together?

Anſw. After you have put down 9 ounces $\frac{1}{2}$ for the value of the Silver, and right under the ſame, 0 for the Copper, you muſt take the Difference of 6 from 9 $\frac{1}{2}$, which is 3 $\frac{1}{2}$, and place the ſame Sum right againſt the 0, to ſignifie the portion of Copper that he muſt take; and the Difference of 0 from 6 is 6: the ſame you muſt ſet right againſt 9 $\frac{1}{2}$, which ſhall repreſent the portion of Silver that he muſt take: and thus you ſee that for 6 pounds

6	9 $\frac{1}{2}$	6 *l. Silver.*
	0	3 *l.* $\frac{1}{2}$ *Copper.*

pounds of Silver that he taketh, he must take 3 pounds ½ of Copper to make the said money of 6 ounces fine.

And if he had 3 sorts of Silver Bullion, that is to say, of 6 ounces fine, of 7 ounces fine, and of 9 ounces fine, and he would make money thereof, which should be but of 5 ounces fine, it behoveth him to mix Copper therewith: and this form doth shew how the same must be combined, and likewise how much he must take of every sort.

$$5\left\{\begin{array}{l}6\\7\\9\\0\end{array}\right. \qquad \begin{array}{r}5\\5\\5\\1\ 2\ 4\end{array}$$

which make 7

6 Likewise a Mint-master hath Bullion of Gold at 19 Carates fine, some at 22 Carates fine, some at 24 Carates, which is full fine without corruption, and he will make Coin thereof which shall be 23 Carates fine: It is demanded how much he must take of every sort?

Answ. Make your Alligation after this manner.

$$23\left\{\begin{array}{l}19\\22\\24\end{array}\right. \qquad \begin{array}{l}1\\1\\4\ \&\ 1\end{array}$$

More, The said Master hath Gold of 20 Carates ½ fine, and of 22 Carates fine, and he will allay the same to 18 Carates fine; and to do the same, it is convenient for him to mix Silver therewith, which is esteemed at 0 Carates fine, but proceeding according to this Rule, he shall find that for 18 pound weight, or other portions that he taketh of the two sorts of Bullion

lion of Gold, he must take 6 pound weight, and ½ of Silver, to allay the same unto 18 Carates fine.

$$18\begin{cases}20\frac{1}{2} \\ 22 \\ 0\end{cases}\begin{matrix}18 \\ 18 \\ 2\frac{1}{2}\end{matrix}$$ *and* 4 *that is* 6½.

7 Again, the said Master hath 100 pound weight of Gold at 22 Carates fine, and 20 pound weight at 19 Carates fine, which he will allay to 20 Carates fine, the Question is, whether he ought to mix any Silver with the same, yea or no, and how much?

Answ. You must consider (by the first part of the Rule of Alligation) the allay of the 100 *l.* and of the 20 *l.* being melted together, and you shall find that the same is of 21 Carates ½ fine, and therefore forasmuch as the same is yet of a better fineness than he would have it, he must therefore mix Silver therewith, that is to say, for 20 pound weight or portion of Gold he must take thereto 1 pound ½ of Silver.

$$20\begin{cases}21\frac{1}{2} \\ 0\end{cases}\begin{matrix}20 \\ 1\frac{1}{2}\end{matrix}$$

8 If he had 1 pound weight fine Silver of 12 ounces fine, I demand how much Copper he must mix with the same, to allay it unto 11 ounces ¼ fine, that is to say, to 11 ounces, 5 peny-weights fine?

Answ. Make your Alligation as before is taught: Then divide the portion of Copper by the portion of fine, and you shall find $\frac{3}{45}$, which being abbreviated is $\frac{1}{15}$; and thus to every pound weight of Silver, you must take $\frac{1}{15}$ of

of a pound of Copper, and for every 11 pound $\frac{1}{4}$ of Silver, you must take $\frac{1}{4}$ of a pound of Copper: And so is to be done with the same, in case that it were of any other allay.

$$11\tfrac{1}{4}\begin{cases}0\\12\end{cases}\begin{matrix}0 & \tfrac{1}{4}\ \textit{Copp.}\\ 11 & \tfrac{1}{4}\ \textit{Silv.}\end{matrix}$$

9 A Master hath 1 pound of fine Gold of 24 Carates fine, which he would allay to 22 Carates fine: The Question is, to know how much Silver must be mixed with the same, that it may be of the fineness of 22 Carates?

Answ. Make your Alligation as before, and take the Difference of 22 from 24, which is 2, then divide 2 by 22, which you cannot, for they are $\frac{2}{22}$, but abbreviate them, and it is $\frac{1}{11}$; and so much Silver, *viz.* $\frac{1}{11}$ part of a pound must be mixed with 1 pound weight of fine Gold, that the same may be of 22 Carates fine.

$$22\begin{cases}0\\24\end{cases}\begin{matrix}2 & \textit{Silver} & \tfrac{1}{11}\\ 22 & \textit{Gold} & 1\ l.\end{matrix}$$

10 A Goldsmith hath 1 pound weight of silver Bullion of 7 ounces fine, it is demanded how much fine silver he must put to the same, that being molten together, it may be of 10 ounces fine?

Answ. Make your Alligation of 7, and 12 unto 10, and then divide the portion of the fine silver by the portion of silver Bullion, and you shall find 1 $\frac{1}{2}$; and thus to 1 pound weight of 7 ounces fine, you must take 1 pound $\frac{1}{2}$ of fine silver of 12 ounces fine, to make the same of 10 ounces fine.

$10\left\{\begin{matrix}12 \\ 7\end{matrix}\right)\begin{matrix}3 \\ 2\end{matrix}$ *fine Silver* $1\frac{1}{2}$ / *courſe Silver* 1

11 A Merchant hath given order to his Factor to lay out for him 83 *l.* 6 *s.* 8 *d.* ſterling in 5 ſorts of Spices, that is to ſay, in Nutmegs of 80 pence the pound, Cloves at 76 pence the pound, Cinnamon at 52 pence the pound, Ginger at 34 pence the pound, and Pepper at 30 pence the pound. But he hath not appointed him the Quantity or Portion which he ſhould buy of every ſort, neither yet of all the ſorts together. The Queſtion is, to know how much the Factor muſt buy of every ſort, to have of each the like Quantity?

Anſw. You muſt add 80, 76, 52, 34, and 30 together, and they make 272: Then you muſt divide 83 *l.* 6 *s.* 8 *d.* being reduced into pence, namely, 20000 pence by 272, and thereof cometh 73 pounds $\frac{2}{17}$, and ſo many pounds muſt he buy of every ſort of the ſaid Spices.

12 But in caſe he would not have ſo many pounds of the one ſort, as he would have of the other, then muſt you take another middle Value between the ſaid particulars.

As for Example, Let the mean Number be 50 pence, then reduce the ſaid 83 *l.* 6 *s.* 8 *d.* into pence, as the other prices are, and they do make 20000 pence, the ſame you muſt divide by 50 pence, which is the mean or common price, and thereof will come 400 pounds.

pounds. And so many pounds must he have of all the sorts together. Then if you will know how many pounds he must have of every sort, you must set down your particular prices after the middle value, that is to say, after 50 pence, as hereafter followeth. And then work by the Rule of Company, and you shall find how much he shall buy of every sort.

	80	20	
	76	16	
50	52	16	
	34	26	*and* 2
	30	30	
		110	

	20?		$72\frac{8}{11}$
	16?		$58\frac{2}{11}$
If 110 give 400, what	16?	*Ans.*	$58\frac{2}{11}$
	28?		$101\frac{9}{11}$
	30?		$109\frac{1}{11}$
			400

CHAP.

CHAP. XV.

Of the Rule of Falshood, or false Positions.

THE Rule of Falshood is so named, not for that it teacheth any Deceit or Falshood, but that by feigned Numbers taken at all adventures, it teacheth to find out the true Number that is demanded. And this (of all the vulgar Rules which are in Practice) is the most excellent: This Rule hath two parts, the one is of one false Position alone; the other is of two Positions, as hereafter shall appear.

Those Questions which are done by false Positions, have their Operations in a manner like unto that of the Rule of Three; but only that in the Rule of Three, we have three Numbers known, and here in this Rule we have but one Number that cometh in use to work by; unto the likeness whereof we must devise two other Numbers, the one multiplying, and the other dividing.

Example.

1 I have delivered to a Banker, a certain Sum of pounds in money, to have of him by the years simply 6 *l.* upon the 100 *l.* and at the end

end of 10 years he paid me 500 *l.* for all both Principal and Gain: I demand how much was the principal Sum that I delivered him at the first? Here you see that there are divers terms, but the chief to work withal is 500 *l.* which cometh of the other Numbers, that is to say, of 10 and 100, for of them is composed or made the Tenor of the Question, the Practice whereof is thus;

Let us feign a Number at pleasure, and with the same let us make our discourse, even as though it were the principal Sum we seek for. As for Example, Suppose that I delivered him at the first 200 *l.* which were worth to me in 10 years 120 *l.* after the rate of 6 *l.* upon the 100 *l.* then 120 *l.* added with 200 *l.* do make but 320 *l.* and I must have 500 *l.* Thus you see that I have three terms of the Rule of Three, the one which shall contain the Question, the other two which I have formed artificially, which are 200 and 320, in such sort, that 320 ought to have such proportion to 200, as 500 hath unto the Number that I seek, that is to say, unto the true principal Sum; then must I have recourse unto the Rule of Three after this sort, saying, If 320 *l.* come of 200 *l.* of how much shall come 500 *l.* I multiply 500 by 200 and they are 10000, which I must divide by 320 *l.* and thereof cometh 312 *l.* $\frac{1}{2}$, which is the Sum that I delivered at the first. And thus this Rule hath some congruence with the double Rule of Three.

2 I have a Cistern with three unequal Cocks, containing 60 Pipes of Water: And if the great-

est

eſt Cock be opened, that Water will void clean in one hour, at the ſecond it will void in two hours, and at the third it will require three hours: Now I demand in what ſpace it will void, all the Cocks being ſet open?

Anſw. Suppoſe that it will void in half an hour, that is to ſay, in 30 minutes. Then muſt there void at the firſt Cock the $\frac{1}{2}$, which is 30 Pipes: and by the ſecond Cock the $\frac{1}{4}$, which is 15 Pipes, and by the third Cock the $\frac{1}{6}$, that is 10 Pipes, all which Sums being added together, do make 55 Pipes, but it ſhould be 60 Pipes: Therefore ſay by the Rule of Three, If 55 Pipes do void in 30 minutes, in how many minutes will 60 Pipes void? Multiply and divide, and you ſhall find 32 minutes $\frac{40}{55}$, which $\frac{40}{55}$ being abbreviated make $\frac{8}{11}$ of a minute, and in that ſpace will the Water void, if all the Cocks be ſet open.

Of the Rule of two falſe Poſitions.

The Sum of this Rule of two falſe Poſitions is thus, when any Queſtion is propoſed appertaining to this Rule: Firſt, you muſt imagine any Number at your pleaſure, which you ſhall name the firſt Poſition, and with the ſame you ſhall work inſtead of the true Number, as the Queſtion doth import; and if you ſee that you have miſſed of the true Number that you ſeek, then is the laſt Number of the work either too great or too little, which Number you ſhall note with the ſign of more or leſs, for that is the firſt Error, in which you have failed, which

signs of more and less shall be noted with these Figures, + —, this Figure + betokeneth more, and this plain Line — signifieth less, that is to say, the one signifieth too much, and the other too little: then you must begin again, and take another Number which shall be the second Position, and work by the Question as before; if you have failed again, note the excess or want, for that is the second Error. Then shall you multiply the first Position by the second Error Cross-wise, and again the second Position by the first Error (and this must alwaies be observed) and you must keep the two Products; then if the signs be both alike, that is to say, either both too much, or both too little, you shall abate the lesser Product from the greater, and likewise you shall subtract the lesser Error from the greater, and by the remain of those Errors, you shall divide the residue of the Products, the Quotient shall be the true Number that you seek. But if the two signs be unlike, that is to say, the one too much, and the other too little, then you shall add those Products together, and likewise you must add both the Errors together, and by the Sum of those Errors, divide the total Sum of both the Products; the Quotient shall be the true Number that you seek, and this is the whole Rule, as by these Examples following it will appear more plain.

Example:

3 A Man lying at the point of Death said, that he had in a certain Coffer 100 Ducates, which

which he bequeathed to three of his Friends by him named, after this ſort: The firſt muſt have a certain portion; the ſecond muſt have twice ſo many as the firſt, abating 8 Ducates; and the third muſt have three times ſo many as the firſt, leſs by 15 Ducates: Now I demand how many every one of them muſt have?

Anſw. Firſt, I do imagine that the firſt man had 30 Ducates, then by the order of the Queſtion, the ſecond ſhould have 52, and the third 75; theſe three Sums being added together make 157, and I ſhould have but 100, ſo that this firſt Error is too much by 57, then I note apart the firſt Poſition 30 with his Error 57 too much, after this ſort, 30 + 57: Therefore I renew my work, and I ſuppoſe that the firſt had 24, then by the order of the Queſtion, the ſecond ſhould have 40, and the third 57, theſe three Sums being added together do make 121, and I muſt have but 100, ſo the ſecond Error is too much by 21: Therefore I note 24 + 21, under the 30 + 57, which was my firſt Poſition with the Error, as you may ſee in the Example following.

Then I multiply Croſs-wiſe, *viz.* 30 which is the firſt Poſition, by 21, which is the ſecond Error, and thereof cometh 630, which I ſet down by the firſt Error; likewiſe I multiply 24, which is the ſecond Poſition, by 57, which

Poſ. *Er.*	
30 + 57	
X	630
	ſubtr.
24 + 21	1368
36	738

is the first Error, and I find 1368, which I set down by the second Error. Then because the signs of the Errors are both alike, that is to say, both too much, I must therefore subtract 630 from 1368, and there will remain 738, which is the Dividend. Again, I must subtract the lesser Error from the greater, that is to say, 21 out of 57, and there will remain 36, which shall be my Divisor.

This done, I divide 738 by 36, and the Quotient will be 20 ½, which 20 ½ is the just Number of the Ducates that the first man had for his part, so consequently the second man had 33 Ducates, and the third 46 ½, as by the working before may appear.

1		
~~738~~	(20 ½	1
~~366~~	33	2
3	46 ½	3
	100	

The like Number will also appear in case the Errors were both too little, as in making the two Positions 18 and 20, you shall find that the two Errors will be both too little, the first will be too little by 15, and the second too little by 3, as by perusing this work, you shall well perceive.

Pos.	*Er.*	
18	— 15	
X		54
		subtr.
20	— 3	300
	12	246

~~246~~	(20 ½
~~122~~	33
1	46 ½
	100

Again, If one of the Errors were too much, and the other too little, yet you shall have the true Number, as before. As if the two Positions were 24 and 20, you shall find that the

first

first Error will be 21 too much, and the second will be 3 too little.

Therefore multiply 24 by 3 Cross-wise, and thereof cometh 72; likewise multiply 20 by 21, the Product will be 420. These two Sums 72 and 420, you shall add together, because the signs of the Errors be unlike, and they make 492, which shall be your Dividend, and again add the lesser Error 3, with the greater Error 21, and they make 24 for your Divisor, then divide 492 by 24, the Quotient will be 20 ½: as before doth plainly appear.

Pos.	*Er.*	
24	+ 21	
X		72
		add
20	— 3	420
	24	492

1
492 (20 ½
244
2

And now because you shall not forget this part of the Rule, learn this brief Remembrance following.

Both Signs alike, Subtraction do require:
But unlike Signs Addition will desire.

The meaning whereof is thus, if both the Errors have like signs, then must the Dividend and the Divisor be made by Subtraction, as is taught before, and if those signs be unlike, then must you by Addition gather the Dividend, and the Divisor, as I have done in this last Example.

4 A Man hath two silver Cups of unequal

 weight

weight, having to them both but one Cover, the weight whereof is 5 ounces, if the Cover be put to the lesser Cup, it will be in double proportion unto the weight of the greater, and the Cover being put to the greater Cup, it will be in triple proportion unto the weight of the lesser; I demand what was the weight of either Cup?

Answ. Suppose that the lesser Cup did weigh 7 ounces, then with the Cover it must weigh 12 ounces, and this weight should be in double proportion unto the greater, therefore the greatest should weigh but 6 ounces, add unto it 5 ounces for the Cover, all will be 11 ounces, but it should be 21, to have it in triple proportion unto 7, which doth represent the weight of the lesser Cup: So that this first Error is too little by 10, which you shall note after 7 in this sort, 7—10.

Pos.	*Er.*	
7 — 10		
X		105
		subtr.
9 — 15		90
	5	15
~~15~~	(3	4
~~5~~	5	5
	8	9

After you shall suppose some other Number as 9, and make the like work as before, so you shall find 15 too little for the second Error, which you shall put behind 9 with the sign less, thus — 15, and then work with the rest as above is said, and you shall find that the lesser Cup weighed three ounces, and consequently the greater four ounces.

5 One man demanded of another in a morning,

ning, what a Clock it was? The other made him this answer, If you do add (saith he) the $\frac{1}{4}$ of the hours, which be past since midnight, with the $\frac{2}{3}$ of the hours which are to come until Noon, you shall have the just hour, that is to say, you shall know what a Clock it was?

Answ. Suppose that it was 4 a Clock in the morning, so should there remain 8 until Noon, then I take the $\frac{1}{4}$ of 4 which is 1, and the $\frac{2}{3}$ of 8, which is $5\frac{1}{3}$, and I add them together, so I find $6\frac{1}{3}$, and I supposed but 4, therefore this first Error is too much by $2\frac{1}{3}$, which I note after my Position, thus, $4 + 2\frac{1}{3}$: then again I suppose another Number, that is to say 9, so should remain but 3 hours until Noon; I take the $\frac{1}{4}$ of 9, and the $\frac{2}{3}$ of 3, which is $2\frac{1}{4}$ and 2, these I add together, and they make $4\frac{1}{2}$, but I supposed that it was 9, therefore the second Error is $4\frac{3}{4}$ too little, which I note behind my Position thus, $9 - 4\frac{3}{4}$.

And then I multiply Cross-wise, as before is taught, and because the signs of the Errors are unlike, that is to say, the one too much, and the other too little, therefore in this work, I must add the Products, and they will be 40: likewise I must add the Errors, and they be $7\frac{1}{12}$. Then I divide 40 by $7\frac{1}{12}$, and thereof cometh 5 hours $\frac{11}{17}$, and that hour it was in the morning.

Pos.	*Er.*	
4 +	$2\frac{1}{3}$	
X		19
		add
9 —	$4\frac{1}{4}$	21
	$7\frac{1}{12}$	40

$$\frac{40}{7\frac{1}{12}}\ (5\tfrac{11}{17}$$

CHAP.

CHAP. XVI.

Of divers Questions Extraordinary, every one of them containing a general Rule for such like Examples.

1 FIve men deviſing of their Ages, the firſt ſaid to the others, that he was 120 years of Age: the ſecond ſaid, if my years were doubled, then ſhould I have ſo many years more than the firſt man, as the firſt hath now more than I have: The third ſaid in like manner, if my years were tripled: The fourth ſaid, if my years were quadrupled, that is to ſay, multiplied by 4: The fifth ſaid, that if his years were quintupled, that is to ſay, multiplied by 5, that they ſhould each of them have ſo many years more than the firſt man, as he hath now more than every one of them. The Queſtion is to know, how old every one of the other 4 men were?

Anſw. You muſt take the Numbers which are neareſt Collaterals, in natural order unto 2, 3, 4, and 5, by reaſon of dupling, tripling, *&c.* And the greater of every of the ſaid Numbers Collaterals, muſt be your Denominator to the leſſer Number: as thus, the next Collateral Numbers unto 2, are 1, and 3, which is $\frac{1}{3}$.

Like-

Likewise the next Collateral Numbers to 3 are 2 and 4, which is $\frac{2}{4}$. And so for 4, are 3 and 5, which are $\frac{3}{5}$, and for 5 are 4 and 6, which be $\frac{4}{6}$: Then if you would know the second mans Age, you must add unto 120 the $\frac{1}{3}$ of it self, which is 40, all is 160, the same you must divide by 2, and thereof cometh 80 years, and so old was the second man: and to know the Age of the third man, you must add unto 120 his own $\frac{2}{4}$, that is to say, his $\frac{1}{2}$ which is 60, and they make 180: the said Sum you must divide by 3, and thereof cometh 60 years for the third mans Age: and after the same manner, you shall find that the fourth man had 48 years, and the fifth had 40 years. The Proof is very easie.

first	120
second	80
third	60
fourth	48
fifth	40

A man having his eye-sight somewhat altered, began to tell and reckon a certain Number of Birds to be in all 18: His Companion that had a clearer sight, beholding well the Birds, answered him that there were not 18; but, said he, if there were twice so many more as there are, there should be as many more above 18, as there are now less than 18. The Question is, to know how many Birds there were in all?

Answ. You must add unto 18 his $\frac{2}{4}$, that is to say, his $\frac{1}{2}$, and thereof will come 27, which you shall divide by 3, and thereof cometh 9, and so many Birds there were in all.

3 A Draper hath bought 24 sorting Cloths, and he hath sold 100 pounds worth of the same Cloths,

Cloths, upon which he hath gained as much as one Cloth did cost him. I demand what one of the said Cloths cost?

Answ. You must add 1 unto 24, and they make 25; then divide 100 by 25, and thereof will come 4 *l.* and so much did one Cloth cost him.

4 A Maid carried Eggs unto the Market, and it happened a merry Fellow met her, who began to jest with her in such sort, that he overthrew her Basket, and brake all her Eggs. The Maid being much displeased with him for breaking the same, said very earnestly unto him, that he should pay for them: the Man considering with himself, that by his folly they were broken, answered the Maid that he would pay her for them, and therefore he demanded of her, what Number she had? The silly poor Wench that could not well reckon, said unto him, that she could not well tell him; but, said she, when I did put them into my Basket by 2 and by 2, there remained 1 Egg; and when I counted them by 3 and by 3, there remained 1; and when I did reckon them by 4 and by 4, there remained still 1; but when I did count them by 5 and by 5, there remained none. The Question is to know how many Eggs the Maid had in all?

Answ. To do this and all such like Questions you must multiply 2, 3, and 4 together, saying, 2 times 3 maketh 6, and 6 times 4 make 24, unto this Number you must add 1, they make 25; and so many Eggs had she in all. But if she had had a greater Number of

Eggs,

Eggs, that ſhe might have counted them till ſhe came to 7 and 7, after the ſame manner as ſhe did till ſhe came to 5 and 5, you muſt multiply theſe Numbers 2, 3, 4, 5, and 6, the one by the other, and thereof will come 720, unto which add 1, and they make 721, and ſo many Eggs ſhe ſhould have had, if ſhe had counted them by 7 and 7.

5. Again, If ſhe had ſaid, that when ſhe counted her Eggs by 2 and by 2, there remained 1, and by 3 and 3, there remained 2, and by 4 and 4, there remained 3, and by 5 and 5, there remained nothing. The Queſtion is to know how many Eggs ſhe ſhould have had?

Anſw. You muſt find a Number the leaſt that you can poſſible, which may be divided by 2, by 3, and by 4, that is to ſay, 12 is the neareſt Number, divide the ſame by 5, and there remaineth 2; this being done, you muſt find two Numbers, the leaſt that is poſſible, which may be divided by 5, and by 2 in ſuch ſort, that the Number that is divided by 2 may exceed the other (that is divided by 5) only by 1, and thoſe two Numbers are 10 and 6, for if you divide 6 by 2, your Quotient will be 3, and 10 divided by 5 bringeth but 2; then conſider, that 6 containeth 3 times 2, and therefore you muſt multiply 12 by 3, and they make 36, from which you muſt ſubtract 1, and there will remain 35, which is the Number that is required to be found.

6 And if ſhe had counted them after the ſame manner unto 7, and there had remained nothing,

nothing; then you know that 60 is the nearest Number that may be divided by 2, 3, 4, 5, and 6, which 60 being divided by 7, there will remain 4, and therefore you must find two Numbers the least that may be, that can be divided by 4 and by 7 in such sort, that that Number which is divided by 4, may exceed the other Number (by 1) that is divided by 7, which two Numbers are 7 and 8, for if you divide 8 by 4, your Quotient will be 2, and dividing 7 by 7, your Quotient will be 1, and therefore because that containeth two times 4, you must multiply 60 by 2, and thereof cometh 120, from which Number you shall subtract 1, and the residue which is 119, is the Number that is required.

7 A Thievish Boy entring into a Garden, did steal from thence a certain Number of Apples; and at his coming forth, he met with three men, one after another, who threatned to accuse him; and to appease them, he gave unto the first the $\frac{1}{2}$ of all his Apples, who received the same with thanks, but he returned him 12 of them back again. Then he gave unto the second the $\frac{1}{2}$ of them that he had remaining, who received the same, but he gave him back again 7 Apples; and so he gave unto the third man, the $\frac{1}{2}$ of the residue, who returned him 4; and in the end he had still remaining 20 Apples. The Question is, to know how many Apples he gathered in the said Garden?

Answ. To do this, you shall subtract 4 from 20, and there will remain 16, the same you shall

shall double, and they make 32, from which you must abate 7, and there will remain 25; the same you shall double, and they make 50; from which you shall subtract 12, and there will remain 38, whereof the double which is 76 doth shew the Number of Apples that he gathered.

This and such like Questions are easie to be done in going backwards from the end of the Question, until you come to the beginning thereof. But if he had given the $\frac{2}{3}$ unto one of them, the $\frac{1}{2}$ unto another, and $\frac{1}{4}$ unto the last, or any other, all the same may be done by the Converse Rule, that is to say, beginning at the end of the Question, till you come to the beginning, as before is said.

8 A Merchant did ride unto three several Fairs; at the first he doubled his money, and spent 10 Crowns; at the second Fair he did also double his money, and spent 10 Crowns; and likewise at the third Fair he did double his money, and spent 10 Crowns, and in the end he found that he had remaining but two Crowns. The Question is, to know how many Crowns he had at the first?

Answ. To do this, you must add unto 10 Crowns the 2 Crowns which he had remaining, and they make 12, whereof you shall take the $\frac{1}{2}$ which is 6, again add 6 unto 10, and they make 16, whereof you shall take the $\frac{1}{2}$ which is 8; Finally, you shall add 8 unto 10, and they make 18, whereof you must take the $\frac{1}{2}$ which is 9; and so he had 9 Crowns at the first.

9 A Burgeſs would diſtribute a certain Sum of Pence unto divers poor men equally, but after that he had counted how many there were in number, he perceived that if he ſhould give unto every man 6 *d.* he ſhould want 14 *d.* But if he ſhould give every man 5 *d.* the piece, he ſhould have 9 *d.* remaining. The Queſtion is, to know the Number of the poor men?

Anſw. To do this and ſuch like Queſtions, you muſt have in remembrance this principle, more from more, and leſs from leſs, *&c.* which is ſet out in two Verſes in the Rule of two falſe Poſitions, that is to ſay, you muſt add the leſs with the more. Namely, 14 with 9, and they make 23; and divide the ſame Sum by the Difference which is of 5 from 6, that is 1; and therefore you muſt divide 23 by 1, but 1 doth neither multiply nor divide, therefore you may conclude, and ſay, that there were 23 poor men.

10 And if he ſhould give to every man 5 *d.* he ſhould have 19 *d.* remaining, and giving every man 7 *d.* he ſhould have 3 *d.* over; In this caſe you muſt abate more from more, that is to ſay, 3 from 19, and the reſt which is 16, you muſt divide by 2, which is the Difference of 5 from 7: and the Quotient, which is 8 doth ſhew you the Number of the poor men, and likewiſe if that he had had both wanting, that is, if both the Numbers had been too little, you muſt have done with them as you did with the others that were both more.

11 A Man hath given unto 20 Work-folks

20*s.* that is to say, to men, women, and boys; to men he gave 20 *d.* apiece, to women 15 *d.* and to boys he gave 8 *d.* The Question is to know how many men, how many women, and how many boys there were in all?

Answ. First you must take the Difference of 8 from 15, and also from 20, and you shall have 7 for the Difference of the Women, and 12 for that of the men: this done, you may suppose that there were 20 boys, which at 8 *d.* apiece make 160, which you must abate from 20*s.* being reduced into pence, that is, from 240*d.* and there will remain 80 *d.* which 80 you shall divide into two such parts, that the one may be divided by 7, and the other by 12, and that nothing may remain after the Divisions are made; which two Numbers are 56 and 24: for 56 being divided by 7, bringeth into the Quotient 8, and 24 being divided by 12 will bring into the Quotient 2: which sheweth that there was 8 women, 2 men, and the rest of the 20, which are 10, were boys; so there were 8 women, 2 men, and 10 boys. Some men call this Rule, the Virgins Rule.

12 A young Scholar being newly come to a Town, where he was to abide for some time, being entertained in a Gentlemans house, as they were sitting at Dinner, there being the Gentleman and his Wife, and 4 Children, which with the Scholar made 7 Persons sitting at the Table, they fell into Discourse about the price of his Diet for a year. But the Scholar not liking the Terms the Gentleman proposed to him, told him he thought he demanded too much for a years

Diet, but he would give him his demand for a so long time as he could daily place those 7 Persons at the Table every day in a several and different order, so that they should never sit twice in the same order. The Gentleman presently accepted of the motion. Now the Question is to cast up how many days the Scholar was to continue with the Gentleman according to this Bargain.

To this purpose you must still multiply your Product by the Figure following. Thus the Figure 1 doth neither multiply nor makes any change, but being multiplied by the next Figure 2, makes two, and so two changes may be made of 2 Persons or Figures, thus, 1, 2. 2, 1. Then multiply this 2 by the next Figure, which is 3, and it makes 6, which shews that 6 changes may be made of three Persons or Figures, thus, 1, 2, 3. 1, 3, 2. 2, 1, 3. 2, 3, 1. 3, 1, 2. 3, 2, 1. Then multiply this Number 6 by the next Figure 4, so 4 times 6 yields 24 changes; and this 24 multiplied by 5 makes 120 changes; and this 120 multiplied by 6 makes 720 changes; lastly 720 multiplied by 7 makes 5040 changes. So that the Scholar might continue there by this Bargain 5040 days, which being divided by 365, the Number of the days in one year, makes 13 years, and

1	1
2	2
3	
6	3
4	
24	4
5	
120	5
6	
720	6
7	
5040	7

2
~~1~~~~3~~95
~~5040~~ (13
~~3655~~
36

295

295 days over, that is nine moneths, and three weeks.

In like manner, if you would ring the changes upon any Number of Bells, you may know how many changes they will make. You see 5 Bells will make 120 changes, and 6 will make 720 changes.

CHAP. XVII.

Of Sports and Pastime done by Number.

To know what Number any one thinketh.

If you would know that Number that any man doth think, or imagine in his mind, as though you could divine: Bid him triple the same Number, then of the Product let him take the $\frac{1}{2}$ if the Number be even, or else the greater half if the same be odd, then bid him triple again the said $\frac{1}{2}$: after say to him, how many times 9 can you give me out of your Number? Or say, can you give 9, 18, 27, 36, &c. and when he can give you no more nines, say, can you give me 1, 2, or 3, more out of your Number? This done, consider how many times 9 you have caused him to abate, for which keep you in mind so many times 2, and if he had any thing remaining besides the

the nines, the ſame ſhall note unto you 1 more.

Example.

Suppoſe that he thought 6, which being tripled is 18, whereof the ½ is 9, the triple of that is 27, now cauſe him to abate 18, or 9, or 27, and again 9; but then he will ſay unto you that he cannot; bid him then abate 3, or 2, or 1, he will ſay alſo that he cannot; wherefore conſidering that you have made him to abate 3 times 9 juſtly, you ſhall tell him that he thought 6, for 3 times 2 make 6. If he had thought 5, the triple thereof is 15, whereof the greater half is 8, the triple of that maketh 24, which containeth 2 times 9, they are worth 4, and the remainder ſignifieth 1, which added together make 5, which is the Number that he thought.

	6
by	3
is	18
½	9
by	3
is	27

Or elſe, if upon the halving of the firſt Product, he cannot halve it exactly, but take the bigger half, as in the laſt Example, 3 times 5 is 15, which cannot be halved, but take the bigger half, which is 8, then for every 9 at the laſt take 2, and add one for the one added to the firſt halving; and ſo you may find the Number thought, without examining whether there remain any thing after the nines are taken away from the laſt Sum.

Thus let the firſt thought be 7, this tripled is 21, which cannot be halved without adding of 1, which makes it 22, the half whereof is

11, and then 3 times 11 is 33, out of which you may take 27, or 3 times 9, which signifie 6, and adding 1 thereto for the 1 it wanted in the halving, so it shews the first Number thought on to be 7.

2 *Another way to know what Number any one thinketh.*

Bid them double the Number they think, then let them add 5 to it, and then multiply it by 5, lastly let them add a Cypher before the Product; Then upon the sight of the Product, subtract 250 from it, and the remaining Figures, cutting off the two last Cyphers, will shew the Number first thought.

Example.

Let the thought be 5, the double thereof is 10, and 5 added thereto is 15, which multiplied by 5 makes 75, to which adding a Cypher it will be 750, from which subtracting 250, there remains 500, from which cut off the 2 last Cyphers, and there remains 5 for the Number first thought.

3 If in any Company, one of them hath a Ring upon his Finger, and you would know by manner of Divining who hath the same, and upon what Finger and what Joynt; cause the Persons to sit down in order, reckoning them 1, 2, 3, 4, &c. and keep likewise an order of their Fingers; then separate your self from them in some certain place, and say unto one of the Lookers on, that he double the

 Num-

Number of him that hath the Ring, which suppose to be 6, the double is 12, and unto the double bid him add 5, so it is 17, and then cause him to multiply this Addition by 5, and it makes 85, and unto the Product bid him add the Number of the Finger of the Person which hath the Ring, which suppose to be 4, the Sum will amount to 89, then bid him put after the same last Number toward his right hand a Figure signifying upon which of the Joynts he hath the Ring, as if it be upon the third Joynt, let him put 3 after 89, and it will be 893, this done, you shall ask him what Number he keepeth, from which you shall abate 250, and you shall have three Figures remaining at the last. The first toward your left hand shall signifie the Number of the Person which hath the Ring, the second or middle Figure shall represent the Number of the Finger, and the last Figure toward your right hand shall betoken the Number of the Joynt. As if the Number which he did keep were 893, from that you shall abate 250, and there will remain 643, which do note unto you, that the sixth Person hath the Ring upon the fourth Finger, and upon his third Joynt.

	6
doubled	12
add	5
	17
mult.	5
	85
Finger	4
	89
Joynt	3
	893
subtr.	250
rest	643

But note, that when you have made your Subtraction, if there do remain a Cypher in the

the place of Tens, that is to say, in the second place, you must then abate 1 from that Figure which is in the place of hundreds, that is to say, from the Figure which is next your left hand, and that shall be worth 10 tenths, signifying the tenth Finger: as if there should remain 703, you must say, that the first Person (upon his tenth Finger, and upon his third Joynt) hath the Ring.

4 And after the same manner, if a man cast 3 Dice, you may know the points of every one of them, for if you cause him to double the points of one Die, and to the double to add 5, and that Sum to multiply by 5, and to the Product add the points of one of the other Dice, and behind that Number toward the right hand, to put the Figure which signifieth the points of the last Die, and then shall you ask him what Number he keepeth, from which abate 250, and there will remain 3 Figures, which do note unto you the points of every Die.

5 *To play at 31 with Numbers.*

If two Persons would strive in sport, who shall make up 31, naming by turns what Number they please not exceeding 6. Abate 7 from 31, there remains 24; then abate 7 from 24, there remains 17; then abate 7 from 17, there remains 10; then abate 7 from 10, there rests 3: begin with this Number 3, or take your advantage to make up any of the other Numbers, 10, 17, or 24, so what

Number soever the other party names after 24, you may easily make it up 31.

Example.

Suppose the first man names the Number	3
The *second* names 2, which makes it	5
Then the first puts 5 more, which makes it	10
Then the *second* puts 4 more, which makes it	14
Then the first names 3 more, which makes it	17
And the *second* puts 6 more, which makes it	23
Then the first names 1 more, which makes it	24
Then the *second* can put but 6, which makes	30
So the first may easily make it	31

6 Likewise, if three of your Companions, that is to say, *Peter*, *James*, and *John*, would (in your absence) give themselves every one a contrary Name, as for Example, *Peter* would be called a King, *James* a Duke, and *John* a Count; and you would divine which of them is called a King, which the Duke, and which the Count: take 24 Stones, or other pieces whatsoever, and give unto *Peter* 1, to *James* 2, and to *John* 3, or otherwise: But mark well to which of them you have given 1, to which 2, and to whom 3. Then leaving the 18 Stones (before them) that are remaining, you shall absent your self from their sight, or else turn your face from them, saying thus unto them: whosoever nameth himself a King, for every Stone that I gave him, let him take 8 of the residue, and he that nameth himself a Duke, for every Stone that I gave him, let him take 2 of them that remain; and he that calleth himself a Count, for every Stone that I gave him,

him, let him take 4: this being done, approach near them, and mark how many Stones are remaining; and know this, that there cannot remain any other Number but one of these six, 1, 2, 3, 5, 6, 7, for which six Numbers, we have chosen to every of them a several Name, which are these; *Angeli*, *Beati*, *Taller*, *Messias*, *Israel*, *Pietas*: each of them containing 3 Vowels, *a*, *e*, *i*, which shew the Names by order; that is to say, the Vowel *a*, sheweth which is the King; the Vowel *e*, telleth which is the Duke; and the Vowel *i*, sheweth which is the Count, in following the order how, and to whom you have given 1 Stone, to whom 2, and to which 3, then if there remain but 1 Stone, the first name *Angeli*, (by these 3 Vowels, *a*, *e*, *i*,) sheweth that *Peter* is King, *James* the Duke, and *John* the Count.

1,	2,	1,	2,	3,	3,
2,	1,	3,	3,	1,	2,
3,	3,	2,	1,	2,	1,
a,	e,	a,	e,	i,	i,
e,	a,	i,	i,	a,	e,
i,	i,	e,	a,	e,	a,
1,	2,	3,	5,	6,	7,
A,	*B*,	*T*,	*M*,	*I*,	*P*,

And if there remain two Stones, the second Name *Beati* shall shew you by these 3 Vowels, *a*, *e*, *i*, that *Peter* is the Duke, *James* the King, and *John* the Count. And so of the other, as by this Table doth plainly appear.

CHAP.

CHAP. XVIII.

Of the Agreement of the Measures and Weights of divers Places in Europe, *the one with the other.*

IN the ensuing Tables the Figures towards the left hand of the Line, shew the Number of Ells, Aulns, Vares, Braces, or Palms, which are equal to the 100 Ells, Aulns, Vares, Braces, or Palms of the place named before the Table: and the odd parts over are set down both in Fractions and Decimals, so that you may use either. The Decimal Fractions are parts of 1000, So that 750 is three quarters, 500 is an half, 250 is a quarter, and 125 half a quarter.

Example.

At *Lions* the 100 Aulns make at *Antwerp* 163 Ells, and 934 parts of an Ell divided into 1000 parts. To know what this 934 parts make, subtract 750, which is three quarters from 934, there remains 184, which is less than a quarter, therefore take 125 from it which is half a quarter, and there remains 059 as much as nothing: therefore the 100 Aulns at *Lions* make at *Antwerp* 163 Ells, three quarters, and half quarter: the like of any other, or else consult the following Table to turn it into Nails.

As

As in the ensuing Tables the Ell is divided into 1000, so the pound is divided into the like parts, and therefore 750 in the Decimal Fraction is three quarters of a pound or 12 ounces, 500 is half a pound or 8 ounces, 250 is a quarter or 4 ounces, and 125 is half a quarter or 2 ounces: But the way to value these Decimal Fractions into ounces, is by multiplying the Numerator of the Fraction by 16, and cut off 3 Figures to the right hand, that which remains to the left hand is ounces.

Nails of Measure, or Ounces of Weight.

Oz. N.	*Decim.*	
1	062,5	1/16
2	125,0	1/8
3	187,5	
4	250,0	1/4
5	312,5	
6	375,0	
7	437,5	
8	500,0	1/2
9	562,5	
0	625,0	
11	687,5	
12	750,0	3/4
13	812,5	
14	875,0	
15	937,5	
16	1000,0	

Example.

100 pounds of *Lions* make at *Antwerp* 90 pounds 823 parts of a pound, which 823 multiplied by 16 the Product is 13,168, from which cut off three Figures to the right hand, there remains 13 ounces; or seek the Number 823, (or the nearest to it, lest it cannot be found) and against it to the right hand you shall find 13 ounces as before; and so likewise the 934 of an Ell in the former Example is very near 15 Nails, which by this Table is 937, 5.

The

The Agreement of the Measures and Weights of divers Countries, the one with the other, being reduced to an equality, and drawn into Tables, as followeth.

London.

100 Yards at *London* make at			or Decimal parts:
Lisbon,	Ells,	80	.000
Antwerp,		133 1/3	.333
Nuremberg,		139 1/3	.333
Franckford,		166 2/3	.667
Dantzick,		110 2/3	.667
Vienna,		116	.000
Arras,		132	.000
Lions,	Aulns	81 1/3	.333
Paris,		76	.000
Roan,		69 1/3	.333
Sevil,	Vares	108	.000
Madera Il.		82	.667
Venice,	Braces	144	.000
Lucques,		160	.000
Florence,		163 1/3	.333
Millan,		184	.000
Genoa,	Palms	384 2/3	.667

London, and Lisbon.

100 Ells at *London* make at

			or Decimal parts.
Antwerp,	Ells	166 $\frac{2}{3}$	.667
Nuremberg,		174 $\frac{1}{6}$	.167
Franckford,		208 $\frac{1}{3}$	.333
Dantzick,		138 $\frac{1}{3}$	.333
Vienna,		145	.000
Arras,		165	.000
Lions,	Aulns	101 $\frac{2}{3}$	.667
Paris,		95	.000
Roan,		86 $\frac{2}{3}$	.667
Sevil,	Vares	135	.000
Madera,		103 $\frac{1}{3}$	.333
Venice,	Braces	180	.000
Lucques,		200	.000
Florence,		204 $\frac{1}{6}$	.167
Millan,		236	.000
Genoa,	Palms	480 $\frac{5}{6}$	.833

The Vares of *Lisbon* are equal to the Ell of *London*, The like for 125 Yards at *London*.

Antwerp.

100 Ells at *Antwerp* make at

			or Decimal parts.
London,	Ells	60	.000
Nuremberg,		104 $\frac{1}{2}$	.500
Franckford,		125	.000
Dantzick,		83	.000
Vienna,		87	.000
Arras,		99	.000
Lions,	Aulns	60	.000
Paris,		57	.000
Roan,		52	.000
Sevil,	Vares	81	.000
Madera,		62	.000
Venice,	Braces	108	.000
Lucques,		120	.000
Florence,		122 $\frac{1}{2}$	.500
Millan,		139	.000
Genoa,	Palms	288 $\frac{1}{2}$	.500

Nurem-

Nuremberg.

100 Ells at *Nuremberg* make at

			or Decimal parts.
London,	Ells	57 $\frac{5}{12}$	.416
Antwerp,		95 $\frac{9}{13}$	.694
Franckford,		119 $\frac{8}{13}$	.617
Dantzick,		79 $\frac{5}{12}$	.414
Vienna,		83 $\frac{1}{4}$	.253
Arras,		94 $\frac{3}{4}$	.736
Lions,	Aulns	58 $\frac{3}{8}$	.373
Paris,		54 $\frac{6}{11}$	.545
Roan,		49 $\frac{19}{25}$	.760
Sevil,	Vares	77 $\frac{1}{2}$	.506
Madera,		59 $\frac{1}{3}$	.330
Venice,	Braces	103 $\frac{1}{3}$	.292
Lucques,		114 $\frac{5}{6}$	.832
Florence,		117 $\frac{2}{9}$	.225
Millan,		132 $\frac{1}{16}$	.057
Genoa,	Palms	276 $\frac{1}{13}$	.076

Franckford.

The Ell at *Leibzick* and *Preslaw* is equal to the Ell at *Franckford.*

100 Ells at *Franckford* make at

			or Decimal parts.
London,	Ells	48	.000
Antwerp,		80	.000
Nuremberg,		83 $\frac{9}{14}$	.648
Dantzick,		64 $\frac{2}{5}$	.400
Vienna,		69 $\frac{3}{5}$	.600
Arras,		79 $\frac{1}{5}$	.200
Lions,	Aulns	48 $\frac{4}{5}$	.800
Paris,		45 $\frac{3}{5}$	.600
Roan,		41 $\frac{3}{5}$	.600
Sevil,	Vares	64 $\frac{4}{5}$	.800
Madera,		49 $\frac{3}{5}$	.600
Venice,	Braces	86 $\frac{2}{5}$	.400
Lucques,		96	.000
Florence,		98	.000
Millan,		110 $\frac{4}{9}$	.440
Genoa,	Palms	239 $\frac{4}{5}$	.800

Dantzick.

Dantzick.

100 Ells at *Dantzick* make at

			or Decimal parts.
London,	Ells	72 $\frac{2}{7}$	.289
Antwerp,		120 $\frac{12}{25}$	.482
Nuremberg,		125 $\frac{9}{10}$	.903
Franckford,		150 $\frac{3}{5}$	.602
Vienna,		104 $\frac{9}{11}$	.819
Arras,		112 $\frac{1}{20}$	.048
Lions,	Aulns	73 $\frac{1}{2}$	.494
Paris,		68 $\frac{3}{5}$	.602
Roan,		62 $\frac{9}{14}$	.650
Sevil,	Vares	97 $\frac{7}{12}$	.590
Madera,		74 $\frac{7}{10}$	.699
Venice,	Braces	130 $\frac{1}{8}$	.120
Lucques,		144 $\frac{4}{7}$	.578
Florence,		147 $\frac{7}{12}$	.590
Millan,		166 $\frac{4}{15}$	.265
Genoa,	Palms	347 $\frac{7}{12}$	.590

Vienna.

100 Ells at *Vienna* make at

			or Decimal parts.
London,	Ells	68 $\frac{24}{25}$	.965
Antwerp,		114 $\frac{15}{16}$	.942
Nuremberg,		120 $\frac{1}{9}$	.114
Franckford,		143 $\frac{2}{3}$	.678
Dantzick,		95 $\frac{2}{5}$	.402
Arras,		113 $\frac{4}{5}$	.793
Lions,	Aulns	70 $\frac{1}{10}$	.101
Paris,		65 $\frac{13}{25}$	.517
Roan,		59 $\frac{16}{25}$	.765
Sevil,	Vares	93 $\frac{1}{10}$	.103
Madera,		71 $\frac{4}{15}$	.264
Venice,	Braces	124 $\frac{2}{15}$	.138
Lucques,		137 $\frac{12}{13}$	.930
Florence,		140 $\frac{4}{5}$	.804
Millan,		158 $\frac{5}{8}$	.620
Genoa,	Palms	331 $\frac{3}{5}$	.601

Arras,

Arras.

100 Ells at *Arras* make at

			or Decimal parts.
London,	Ells	60 3/5	.606
Antwerp,		101	.010
Nuremberg,		155 5/9	.555
Franckford,		126 4/15	.262
Dantzick,		83 5/6	.838
Vienna,		87 7/8	.878
Lions,	Aulns	61 8/13	.616
Paris,		57 4/7	.575
Roan,		52 8/15	.525
Sevil,	Vares	80 2/11	.180
Madera,		62 8/13	.626
Venice,	Braces	109 1/11	.090
Lucques,		121 3/14	.212
Florence,		123 2/15	.131
Millan,		139 2/5	.394
Genoa,	Palms	291 5/12	.414

Lions.

100 Aulns at *Lions* make at

			or Decimal parts.
London,	Ells	98 4/11	.362
Antwerp,		163 13/14	.934
Nuremberg,		171 5/16	.311
Franckford,		204 11/12	.918
Dantzick,		136 1/16	.065
Vienna,		142 8/13	.623
Arras,		162 4/13	.295
Paris,	Aulns	93 4/9	.443
Roan,		85 1/4	.246
Sevil,	Vares	132 4/5	.791
Madera,		101 9/14	.640
Venice,	Braces	177 1/20	.049
Lucques,		196 5/7	.721
Florence,		200 9/11	.819
Millan,		226 2/9	.229
Genoa,	Palms	472 19/20	.950

Paris,

Paris.

100 Aulns at *Paris* make at

			or Decimal parts.
London,	Ells	105 $\frac{4}{15}$	.263
Antwerp,		175 $\frac{2}{16}$	.439
Nuremberg,		183 $\frac{1}{3}$	.333
Franckford,		219 $\frac{4}{13}$	.298
Dantzick,		145 $\frac{8}{13}$	.615
Vienna,		152 $\frac{5}{8}$	.630
Arras,		173 $\frac{48}{50}$	.984
Lions,	Aulns	107	.000
Roan,		91 $\frac{3}{13}$	.228
Sevil,	Vares	142 $\frac{1}{10}$	.105
Madera,		108 $\frac{4}{5}$	.793
Venice,	Braces	189 $\frac{12}{25}$	.474
Lucques,		210 $\frac{8}{15}$	.526
Florence,		214 $\frac{11}{12}$	.911
Millan,		242 $\frac{1}{10}$	.105
Genoa,	Palms	506 $\frac{2}{15}$	.136

Roan.

100 Aulns at *Roan* make at

			or Decimal parts.
London,	Ells	115 $\frac{5}{13}$	.384
Antwerp,		192 $\frac{4}{13}$	.307
Nuremberg,		200 $\frac{24}{25}$	.961
Franckford,		240 $\frac{5}{13}$	.384
Dantzick,		159 $\frac{8}{13}$	.615
Vienna,		167 $\frac{4}{13}$	.307
Arras,		190 $\frac{5}{13}$	.384
Lions,	Aulns	117 $\frac{4}{13}$	.307
Paris,		109 $\frac{8}{13}$	.615
Sevil,	Vares	155 $\frac{10}{13}$	.769
Madera,		119 $\frac{3}{13}$	.230
Venice,	Braces	207 $\frac{3}{5}$	.592
Lucques,		230 $\frac{10}{13}$	.768
Florence,		235 $\frac{9}{16}$	.565
Millan,		265 $\frac{5}{13}$	.384
Genoa,	Palms	554 $\frac{4}{5}$	.807

Sevil.

100 Vares at *Sevil* make at

			or Decimal parts.
London,	Ells	74 $\frac{1}{13}$	.074
Antwerp,		123 $\frac{2}{11}$	.457
Nuremberg,		129 $\frac{1}{100}$	.012
Franckford,		154 $\frac{1}{3}$	.321
Dantzick,		102 $\frac{7}{15}$	.469
Vienna,		107 $\frac{2}{5}$	.407
Arras,		122 $\frac{2}{9}$	.222
Lions,	Aulns	75 $\frac{4}{13}$	.308
Paris,		70 $\frac{1}{8}$	.370
Roan,		64 $\frac{1}{5}$	.197
Madera,	Vares	76 $\frac{4}{9}$	.543
Venice,	Braces	133 $\frac{1}{3}$	.333
Lucques,		148 $\frac{1}{20}$	.148
Florence,		151 $\frac{3}{13}$	.234
Millan,		170 $\frac{3}{8}$	.370
Genoa,	Palms	356 $\frac{3}{17}$	.174

The *Isles* of Madera.

100 Vares at *Madera* make at

			or Decimal parts.
London,	Ells	96 $\frac{7}{9}$	.772
Antwerp,		161 $\frac{2}{7}$	.290
Nuremberg,		168 $\frac{6}{11}$	.548
Franckford,		201 $\frac{8}{13}$	.613
Dantzick,		133 $\frac{7}{8}$	.871
Vienna,		140 $\frac{1}{3}$	.322
Arras,		159 $\frac{2}{3}$	.677
Lions,	Aulns	98 $\frac{5}{13}$	.387
Paris,		91 $\frac{14}{15}$	.935
Roan,		83 $\frac{7}{8}$	.871
Sevil,	Vares	130 $\frac{2}{14}$	.645
Venice,	Braces	174 $\frac{2}{9}$	.226
Lucques,		193 $\frac{4}{9}$	.448
Florence,		197 $\frac{9}{10}$	.903
Millan,		222 $\frac{7}{12}$	.583
Genoa,	Palms	465 $\frac{2}{9}$	.226

Venice.

100 Braces at *Venice* make at

			or Decimal parts.
London,	Ells	55 5/9	.555
Antwerp,		92 6/11	.542
Nuremberg,		96 15/19	.790
Franckford,		115 3/4	.741
Dantzick,		76 6/7	.853
Vienna,		80 1/20	.055
Arras,		91 7/10	.696
Lions,	Aulns	56 12/25	.481
Paris,		52 7/9	.777
Roan,		48 3/20	.148
Sevil,	Vares	75	.000
Madera,		57 2/5	.407
Lucques,	Braces	111 1/9	.111
Florence,		113 3/7	.426
Millan,		127 7/9	.777
Genoa,	Palms	266 1/50	.018

Lucques.

100 Braces at *Lucques* make at

			or Decimal parts.
London,	Ells	50	.000
Antwerp,		63 1/3	.333
Nuremberg,		87 1/12	.083
Franckford,		104 1/6	.166
Dantzick,		69 1/6	.166
Vienna,		72 1/2	.500
Arras,		82 1/2	.500
Lions,	Aulns	50 5/6	.833
Paris,		47 1/2	.500
Roan,		43 1/3	.333
Sevil,	Vares	67 1/2	.500
Madera,	Braces	51 2/3	.666
Venice,		90	.000
Florence,		102 1/12	.083
Millan,		115	.000
Genoa,	Palms	240 1/12	.416

Florence.

100 Braces at *Florence* make at

				or Decimal parts.
London,	Ells	48	$\frac{49}{50}$	.979
Antwerp,		81	$\frac{7}{11}$	.632
Nuremberg,		85	$\frac{4}{13}$	.306
Franckford,		102	$\frac{1}{20}$	.040
Dantzick,		67	$\frac{3}{4}$	.755
Vienna,		71	$\frac{1}{50}$	.020
Arras,		80	$\frac{4}{5}$	.808
Lions,	Aulns	49	$\frac{4}{5}$	.796
Paris,		46	$\frac{8}{15}$	.530
Roan,		42	$\frac{4}{9}$	.449
Sevil,	Vares	66	$\frac{1}{8}$	.122
Madera,		50	$\frac{8}{13}$	.612
Venice,	Braces	88	$\frac{1}{6}$	.163
Lucques,		97	$\frac{24}{25}$	.959
Millan,		112	$\frac{13}{20}$	.653
Genoa,	Palms	235	$\frac{1}{2}$	.510

Millan.

100 Braces at *Millan* make at

				or Decimal parts.
London,	Ells	43	$\frac{12}{25}$	.478
Antwerp,		72	$\frac{6}{13}$	.463
Nuremberg,		75	$\frac{8}{11}$	.724
Franckford,		90	$\frac{7}{12}$	.579
Dantzick,		60	$\frac{1}{7}$	.145
Vienna,		63	$\frac{1}{23}$	.043
Arras,		70	$\frac{3}{17}$	.174
Lions,	Aulns	44	$\frac{1}{5}$	.202
Paris,		41	$\frac{3}{14}$	.217
Roan,		37	$\frac{11}{16}$	.680
Sevil,	Vares	58	$\frac{9}{13}$	.695
Madera,		44	$\frac{12}{13}$	.926
Venice,	Braces	78	$\frac{5}{19}$	.260
Lucques,		86	$\frac{19}{20}$	.956
Florence,		88	$\frac{16}{25}$	.768
Genoa,	Palms	209	$\frac{7}{12}$	.058

The

The Agreement of the Weights of divers Countries, the one with the other, being reduced to an equality, and drawn into Tables, as followeth.

London.

The Hundred or 112 pound weight at *London* makes at

Antwerp,	107 $\frac{5}{8}$	.625
Lisbon, Franckf.	99	.000
Nuremberg,	100 $\frac{1}{2}$	.500
Roan,	98	.000
Lions,	118 $\frac{1}{2}$	.500
Paris,	102 $\frac{1}{4}$	.250
Diep,	100 $\frac{1}{4}$	.250
Genva,	90 $\frac{3}{8}$	.375
Tholouse,	122 $\frac{3}{4}$	.750
Rochel,	124 $\frac{7}{8}$	.875
Marseilles,	124 $\frac{1}{4}$	.250
Sevil,	109 $\frac{3}{4}$	.750
Venice subt.	166 $\frac{7}{8}$	.875
Venice gros.	105 $\frac{3}{8}$	.375
Vienna,	89 $\frac{3}{8}$	.375
Preslaw,	134 $\frac{5}{8}$	.625
Leibzick,	101 $\frac{1}{4}$	.250
Dantzick,	129 $\frac{1}{4}$	.250
Lubeck,	97 $\frac{3}{8}$	.375
Barcellone,	143 $\frac{1}{2}$	.500
Genoa,	157 $\frac{1}{4}$	.250

or Decimal parts.

Antwerp.

100 pound weight at *Antwerp* makes at		or Decimal parts.
London,	104 $\frac{1}{15}$	.065
Lisbon, Franckf.	91	.986
Nuremberg,	93 $\frac{1}{8}$	.371
Roan,	91 $\frac{1}{16}$	.057
Lions,	110 $\frac{1}{10}$	.104
Paris,	95	.000
Diep,	93 $\frac{1}{7}$	.147
Geneva,	84	.000
Tholouse,	114 $\frac{1}{18}$	.053
Rochel,	116 $\frac{1}{30}$	.028
Marseilles,	115 $\frac{4}{9}$	.447
Sevil,	101 $\frac{16}{17}$	.974
Venice subt.	155 $\frac{1}{19}$	.052
Venice gros.	97 $\frac{12}{11}$	.909
Vienna,	83 $\frac{1}{24}$	.043
Preslaw,	125 $\frac{1}{12}$	.087
Leibzick,	94 $\frac{1}{13}$	.076
Dantzick,	120 $\frac{1}{11}$	.093
Lubeck,	90 $\frac{8}{17}$	.476
Barcellone,	133 $\frac{1}{3}$	.333
Genoa,	146 $\frac{1}{9}$	.109

Franck.

Franckford or Lisbon.

100 pound weight at *Franckford* or *Lisbon* makes at

			or Decimal parts.
London,	113	$\frac{2}{15}$	.131
Antwerp,	108	$\frac{5}{7}$	.713
Nuremberg,	101	$\frac{5}{19}$	.262
Roan,	99		.000
Lions,	119	$\frac{14}{20}$	.696
Paris,	103	$\frac{2}{7}$	.282
Diep,	101	$\frac{5}{19}$	.263
Geneva,	91	$\frac{2}{7}$	.288
Tholouse,	124		.000
Rochel,	126	$\frac{2}{15}$	.136
Marseilles,	125	$\frac{1}{2}$	.505
Sevil,	110	$\frac{6}{7}$	.858
Venice subt.	168	$\frac{2}{3}$	.561
Venice gros.	106	$\frac{5}{11}$	.439
Vienna,	90	$\frac{3}{11}$	.277
Preslaw,	136		.000
Leibzick,	102	$\frac{3}{11}$	.272
Dantzick,	130	$\frac{5}{9}$	.555
Lubeck,	98	$\frac{5}{14}$	.358
Barcellone,	144	$\frac{19}{20}$	.949
Genoa,	158	$\frac{5}{6}$	.838

The Hundred Weight at *Franckford* is equal to the Hundred Weight at *Lisbon*.

Nuremberg.

100 pound weight at *Nuremberg* makes at

London,	111 $\frac{4}{9}$	.442
Antwerp,	107 $\frac{1}{12}$	.089
Lisbon, Franckf.	98 $\frac{1}{2}$	.508
Roan,	97 $\frac{1}{2}$	.512
Lions,	117	.910
Paris,	101 $\frac{10}{11}$	.711
Diep,	99 $\frac{3}{4}$	.751
Geneva,	89 $\frac{13}{14}$	.927
Tholouse,	122 $\frac{2}{15}$	.139
Rochel,	124 $\frac{1}{4}$	.254
Marseilles,	123 $\frac{5}{8}$	.632
Sevil,	109 $\frac{1}{5}$	.204
Venice subt.	166 $\frac{4}{9}$	.445
Venice gros.	104 $\frac{11}{13}$	.850
Vienna,	88 $\frac{14}{15}$	.930
Preslaw,	133 $\frac{21}{22}$	.955
Leibzick,	109 $\frac{3}{4}$	.746
Dantzick,	128 $\frac{3}{5}$	.607
Lubeck,	96 $\frac{8}{9}$	.890
Barcellone,	142 $\frac{11}{14}$	.786
Genoa,	156 $\frac{7}{15}$	.467

or Decimal parts.

Roan.

Roan.

100 pound weight at *Roan* makes at		or Decimal parts.
London,	114 $\frac{2}{7}$	.285
Antwerp,	109 $\frac{9}{11}$	.821
Lisbon, Franckf.	101 $\frac{1}{50}$	.020
Nuremberg,	102 $\frac{5}{9}$	.551
Lions,	120 $\frac{11}{12}$	.918
Paris,	104 $\frac{1}{3}$	.336
Diep,	102 $\frac{5}{17}$	.296
Geneva,	92 $\frac{3}{14}$	.219
Tholouse,	125 $\frac{1}{4}$	.255
Rochel,	127 $\frac{8}{19}$	.423
Marseilles,	126 $\frac{4}{5}$	.796
Sevil,	112	.000
Venice subt.	170 $\frac{1}{4}$	.250
Venice gros.	107 $\frac{1}{2}$	.525
Vienna,	91 $\frac{1}{5}$	.199
Preslaw,	137 $\frac{1}{3}$	.347
Leibzick,	103 $\frac{1}{3}$	.316
Dantzick,	131 $\frac{9}{10}$	.898
Lubeck,	99 $\frac{4}{11}$	.362
Barcellone,	146 $\frac{8}{15}$	.530
Genoa,	160 $\frac{5}{11}$	.459

Lions.

Lions.

100 pound weight at *Lions* makes at		or Decimal parts.
London,	94 1/2	.516
Antwerp,	90 9/11	.823
Lisbon, Franckf.	83 6/11	.544
Nuremberg,	84 4/5	.810
Roan,	82 7/10	.700
Paris,	86 2/7	.287
Diep,	84 3/5	.599
Geneva,	76 4/15	.265
Tholouse,	103 10/17	.589
Rochel,	105 3/8	.380
Marseilles,	103 11/13	.850
Sevil,	92 8/13	.616
Venice subt.	140 9/11	.823
Venice gros.	88 13/14	.928
Vienna,	75 8/19	.422
Preslaw,	113 3/5	.607
Leibzick,	85 4/9	.443
Dantzick,	109 1/13	.072
Lubeck,	82 3/17	.173
Barcellone,	121 1/10	.097
Genoa,	132 7/10	.700

Paris.

Paris.

100 pound weight at *Paris* makes at		or Decimal parts.
London,	109 $\frac{2}{13}$	.535
Antwerp,	105 $\frac{1}{4}$	.256
Lisbon, Franckf.	96 $\frac{2}{11}$	.821
Nuremberg,	98 $\frac{1}{3}$	.329
Roan,	95 $\frac{11}{13}$	.843
Lions,	115 $\frac{8}{9}$	.892
Diep,	98 $\frac{1}{24}$	.044
Geneva,	88 $\frac{5}{13}$	.386
Tholouse,	120 $\frac{1}{20}$	.049
Rochel,	122 $\frac{1}{7}$	.146
Marseilles,	121 $\frac{1}{2}$	.515
Sevil,	107 $\frac{1}{3}$	.334
Venice subt.	163 $\frac{1}{5}$	.203
Venice gros.	103 $\frac{1}{6}$	.056
Vienna,	87 $\frac{2}{5}$	.408
Preslaw,	131 $\frac{2}{3}$	.663
Leibzick,	99 $\frac{1}{50}$	.022
Dantzick,	126 $\frac{2}{5}$	.406
Lubeck,	95 $\frac{1}{4}$	.232
Barcellone,	140 $\frac{1}{3}$	.342
Genoa,	153 $\frac{15}{19}$	.789

The Hundred Weight at *Collen* and *Ausburg* is equal to the Hundred Weight at *Paris*.

Diep.

Diep.

100 pound weight at *Diep* makes at

		or Decimal parts.
London,	111 5/7	.720
Antwerp,	107 5/14	.357
Lisbon, Franckf.	98 3/4	.753
Nuremberg,	100 1/4	.249
Roan,	97 3/4	.755
Lions,	118 1/5	.204
Paris,	102	.000
Geneva,	90 3/20	.149
Tholouse,	122 4/9	.443
Rochel,	124 9/16	.563
Marseilles,	123 16/17	.940
Sevil,	109 9/19	.476
Venice subt.	166 5/11	.458
Venice gros.	105 1/9	.112
Vienna,	89 2/13	.152
Preslaw,	134 2/7	.288
Leibzick,	100 7/10	.697
Dantzick,	128 1/39	.027
Lubeck,	97 2/15	.132
Barcellone,	143 1/24	.042
Genoa,	156 6/7	.857

Geneva.

100 pound weight at *Geneva* makes at — or Decimal parts.

London,	123 $\frac{11}{14}$	.928
Antwerp,	119 $\frac{1}{11}$	.087
Lisbon, Franckf.	109 $\frac{6}{11}$	.543
Nuremberg,	111 $\frac{1}{50}$	.022
Roan,	108 $\frac{7}{16}$	.437
Lions,	131 $\frac{1}{8}$	.123
Paris,	113 $\frac{2}{15}$	.138
Diep,	110 $\frac{11}{14}$	.926
Tholouse,	135 $\frac{9}{11}$	.823
Rochel,	138 $\frac{3}{17}$	.174
Marseilles,	137 $\frac{12}{25}$	.482
Sevil,	121 $\frac{7}{16}$	.438
Venice subt.	184 $\frac{7}{11}$	.637
Venice gros.	116 $\frac{3}{5}$	.597
Vienna,	98 $\frac{8}{9}$	.893
Preslaw,	148 $\frac{24}{25}$	.962
Leibzick,	112 $\frac{1}{36}$	.028
Dantzick,	143 $\frac{1}{67}$	.015
Lubeck,	107 $\frac{3}{4}$	.745
Barcellone,	158 $\frac{11}{14}$	.782
Genoa,	174	.000

Tholouse.

Tholouse.

100 pound weight at *Tholouse* makes at

London,	91 $\frac{1}{4}$	.254
Antwerp,	87 $\frac{2}{3}$	.678
Lisbon, Franckf.	80 $\frac{8}{13}$	.651
Nuremberg,	81 $\frac{7}{8}$	.875
Roan,	79 $\frac{7}{8}$	.878
Lions,	96 $\frac{7}{13}$	.537
Paris,	83 $\frac{3}{10}$	.299
Di p,	81 $\frac{2}{3}$	.670
Geneva,	73 $\frac{5}{8}$	.625
Rochel,	101 $\frac{11}{15}$	.730
Marseilles,	101 $\frac{2}{9}$	.220
Sevil,	89 $\frac{2}{5}$	.409
Venice subt.	135 $\frac{19}{20}$	.947
Venice gros.	85 $\frac{11}{13}$	.845
Vienna,	72 $\frac{13}{16}$	.810
Preslaw,	109 $\frac{11}{16}$	.674
Leibzick,	82 $\frac{1}{2}$	.484
Dantzick,	105 $\frac{5}{17}$	.295
Lubeck,	79 $\frac{1}{50}$	.022
Barcellone,	116 $\frac{9}{10}$	.904
Genoa,	128 $\frac{1}{10}$	.106

or Decimal parts.

Rochel.

100 pound weight at *Rochel* makes at		or Decimal parts.
London,	89 $\frac{9}{13}$	.689
Antwerp,	86 $\frac{3}{16}$	.187
Lisbon, Franckf.	79 $\frac{2}{7}$	.279
Nuremberg,	80 $\frac{12}{25}$	.480
Roan,	78 $\frac{12}{25}$	.478
Lions,	94 $\frac{9}{10}$	.895
Paris,	81 $\frac{8}{9}$	.882
Diep,	80 $\frac{2}{7}$	.280
Geneva,	72 $\frac{3}{8}$	.373
Tholouse,	98 $\frac{3}{10}$	.298
Marseilles,	99 $\frac{1}{2}$	.499
Sevil,	87 $\frac{8}{9}$	.888
Venice subt.	133 $\frac{7}{11}$	.638
Venice gros.	84 $\frac{5}{13}$	.380
Vienna,	71 $\frac{4}{7}$	.571
Preslaw,	107 $\frac{4}{5}$	.807
Leibzick,	81 $\frac{1}{12}$	.081
Dantzick,	103 $\frac{1}{2}$	.503
Lubeck,	77 $\frac{49}{50}$	.978
Barcellone,	114 $\frac{10}{11}$	.914
Genoa,	125 $\frac{13}{14}$	.925

Marseilles.

Marseilles.

100 pound weight at *Marseilles* makes at

		or Decimal parts.
London,	90 $\frac{1}{7}$	.140
Antwerp,	86 $\frac{5}{8}$	.627
Lisbon, Franckf.	79 $\frac{2}{3}$	.678
Nuremberg,	80 $\frac{8}{9}$	.885
Roan,	78 $\frac{7}{8}$	.873
Lions,	95 $\frac{3}{8}$	.372
Paris,	82 $\frac{5}{17}$	.293
Diep,	80 $\frac{11}{16}$	.684
Geneva,	72 $\frac{1}{14}$	.068
Tholouse,	98 $\frac{5}{7}$	.712
Rochel,	100 $\frac{1}{2}$	.502
Sevil,	88 $\frac{1}{3}$	.322
Venice subt.	134 $\frac{4}{13}$	.306
Venice grof.	84 $\frac{13}{16}$	.809
Vienna,	71 $\frac{14}{15}$	.931
Preslaw,	108 $\frac{7}{20}$	.350
Leibzick,	81 $\frac{1}{2}$	.489
Dantzick,	104 $\frac{1}{42}$	.024
Lubeck,	78 $\frac{3}{8}$	.370
Barcellone,	115 $\frac{1}{2}$	.493
Genoa,	126 $\frac{5}{9}$	.558

Sevil.

Sevil.

100 pound weight at *Sevil* makes at

		or Decimal parts.
London,	102 $\frac{1}{20}$	.050
Antwerp,	98 $\frac{1}{16}$	.063
Lisbon, Franckf.	90 $\frac{1}{5}$	.205
Nuremberg,	91 $\frac{4}{7}$	.571
Roan,	89 $\frac{1}{5}$	.202
Lions,	107 $\frac{12}{33}$	.972
Paris,	93 $\frac{1}{6}$	.166
Diep,	91 $\frac{1}{6}$	.161
Geneva,	82 $\frac{7}{20}$	.346
Tholouse,	111 $\frac{11}{13}$	.845
Rochel,	113 $\frac{7}{9}$	.781
Marseilles,	113 $\frac{3}{14}$	.212
Venice subt.	152 $\frac{1}{20}$	.050
Venice gros.	96	.014
Vienna,	81 $\frac{7}{16}$	.435
Preslaw,	122 $\frac{2}{3}$	.665
Leibzick,	92 $\frac{1}{4}$	.255
Dantzick,	117 $\frac{16}{25}$	.767
Lubeck,	88 $\frac{8}{11}$	.724
Barcellone,	130 $\frac{3}{4}$	.751
Genoa,	143 $\frac{1}{3}$	.325

Venice *subtile Weight.*

100 pound subtile weight at *Venice* makes at

		or Decimal parts.
London,	67 1/9	.115
Antwerp,	64 1/2	.494
Lisbon, Franckf.	59 1/40	.025
Nuremberg,	60 2/9	.224
Roan,	58 8/11	.726
Lions,	71 1/90	.011
Paris,	61 3/11	.274
Diep,	60 1/14	.074
Geneva,	54 2/13	.157
Tholouse,	73 5/9	.558
Rochel,	74 5/6	.831
Marseilles,	74 5/11	.457
Sevil,	65 7/9	.768
Venice gros.	63 1/7	.146
Vienna,	53 5/9	.558
Preslaw,	80 2/3	.674
Leibzick,	60 2/3	.674
Dantzick,	77 5/11	.453
Lubeck,	52 3/10	.299
Barcellone,	86	.000
Genoa,	94 3/13	.232

Venice.

Venice *gross Weight.*

100 pound gross weight at *Venice* makes at

		or Decimal parts.
London,	106 $\frac{2}{7}$	.287
Antwerp,	102 $\frac{2}{15}$	.135
Lisbon, Franckf.	93 $\frac{19}{20}$	.950
Nuremberg,	95 $\frac{3}{8}$	.373
Roan,	93	.000
Lions,	112 $\frac{6}{13}$	.467
Paris,	97 $\frac{1}{29}$	.034
Diep,	95 $\frac{2}{15}$	.136
Geneva,	85 $\frac{10}{13}$	.765
Tholouse,	116 $\frac{1}{2}$	.489
Rochel,	118 $\frac{1}{2}$	.505
Marseilles,	117 $\frac{10}{11}$	.912
Sevil,	104 $\frac{3}{20}$	.151
Venice subt.	158 $\frac{4}{11}$	.363
Vienna,	84 $\frac{9}{11}$	.816
Preslaw,	127 $\frac{16}{25}$	.758
Leibzick,	96 $\frac{1}{12}$	.087
Dantzick,	122 $\frac{3}{4}$	.742
Lubeck,	92 $\frac{5}{12}$	.408
Barcellone,	126 $\frac{3}{11}$	.275
Genoa,	149 $\frac{3}{13}$	.229

Vienna.

100 pound weight at *Vienna* makes at

		or Decimal parts.
London,	125 6/19	.315
Antwerp,	120 8/19	.420
Lisbon, Franckf.	110 10/13	.769
Nuremberg,	112 4/9	.447
Roan,	109 11/20	.650
Lions,	132 3/5	.598
Paris,	114 2/5	.405
Diep,	112 1/6	.168
Geneva,	101 2/17	.118
Tholouse,	137 7/20	.343
Rochel,	139 5/7	.720
Marseilles,	139 1/43	.021
Sevil,	122 4/5	.797
Venice subt.	186 5/7	.712
Venice gros.	117 9/10	.902
Preslaw,	150 5/8	.629
Leibzick,	113 2/7	.286
Dantzick,	144 8/13	.615
Lubeck,	108 19/20	.951
Barcellone,	160 1/18	.055
Genoa,	175 16/17	.943

Preslaw.

Preslaw.

100 pound weight at *Preslaw* makes at

		or Decimal parts.
London,	83 $\frac{1}{5}$	.195
Antwerp,	79 $\frac{16}{17}$	.944
Lisbon, Franckf.	73 $\frac{6}{11}$	.537
Nuremberg,	74 $\frac{13}{20}$	.652
Roan,	72 $\frac{4}{5}$	.795
Lions,	88 $\frac{1}{45}$	.022
Paris,	95 $\frac{19}{20}$	.951
Diep,	74 $\frac{7}{15}$	.466
Geneva,	67 $\frac{2}{15}$	.131
Tholouse,	91 $\frac{3}{17}$	.179
Rochel,	92	.757
Marseilles,	92 $\frac{16}{25}$	.220
Sevil,	81 $\frac{10}{19}$	.522
Venice subt.	123 $\frac{19}{20}$	.955
Venice gros.	78 $\frac{3}{11}$	.273
Vienna,	66 $\frac{5}{13}$	.387
Leibzick,	75	.009
Dantzick,	96 $\frac{1}{12}$	.087
Lubeck,	72 $\frac{1}{3}$	.330
Barcellone,	106 $\frac{3}{5}$	.592
Genoa,	116 $\frac{4}{5}$	.805

Leibzick.

100 pound weight at *Leibzick* makes at

London,	110 $\frac{8}{13}$	.617
Antwerp,	106 $\frac{5}{17}$	.296
Lisbon, Franckf.	97 $\frac{15}{19}$	.788
Nuremberg,	99 $\frac{1}{4}$	.259
Roan,	96 $\frac{15}{19}$	.790
Lions,	116 $\frac{15}{16}$	.938
Paris,	100 $\frac{42}{50}$	.987
Diep,	99 $\frac{1}{83}$	.012
Geneva,	89 $\frac{1}{4}$	.259
Tholouse,	121 $\frac{3}{13}$	.234
Rochel,	123 $\frac{1}{3}$	.333
Marseilles,	122 $\frac{5}{7}$	.716
Sevil,	108 $\frac{2}{5}$	.395
Venice subt.	164 $\frac{2}{11}$	.814
Venice gros.	104 $\frac{1}{13}$	.074
Vienna,	88 $\frac{3}{11}$	.272
Preslaw,	132 $\frac{24}{25}$	.963
Dantzick,	127 $\frac{13}{20}$	.654
Lubeck,	96 $\frac{3}{17}$	.172
Barcellone,	141 $\frac{5}{6}$	.827
Genoa,	155 $\frac{4}{13}$	.308

or Decimal parts.

Dantzick.

100 pound weight at *Dantzick* makes at

		or Decimal parts.
London,	86 $\frac{1}{3}$	.653
Antwerp,	83 $\frac{4}{13}$	.268
Lisbon, Franckf.	76 $\frac{3}{5}$	.595
Nuremberg,	77 $\frac{3}{4}$	.756
Roan,	75 $\frac{1}{6}$	.822
Lions,	91 $\frac{11}{16}$	.683
Paris,	79 $\frac{1}{9}$	.110
Diep,	77 $\frac{2}{16}$	.563
Geneva,	69 $\frac{12}{13}$	.922
Tholouse,	94 $\frac{2}{3}$	.671
Rochel,	96 $\frac{1}{13}$	.615
Marseilles,	96 $\frac{1}{15}$	.131
Sevil,	84 $\frac{11}{12}$	.913
Venice subt.	129 $\frac{1}{9}$	.110
Venice gros.	81 $\frac{10}{19}$	.520
Vienna,	69 $\frac{1}{20}$	.148
Preslaw,	104 $\frac{2}{13}$	.158
Leibzick,	78 $\frac{1}{3}$	.336
Lubeck,	75 $\frac{1}{3}$	.337
Barcellone,	111 $\frac{1}{43}$	.025
Genoa,	121 $\frac{2}{3}$	.663

Lubeck.

100 pound weight at *Lubeck* makes at

		or Decimal parts.
London,	115	.019
Antwerp,	110 $\frac{1}{2}$	.526
Lisbon, Franckf.	101 $\frac{2}{3}$	.667
Nuremberg,	103 $\frac{1}{5}$	.209
Roan,	100 $\frac{2}{3}$	.642
Lions,	121 $\frac{2}{3}$	.694
Paris,	105	.006
Diep,	102 $\frac{12}{20}$	.952
Geneva,	92 $\frac{4}{5}$	.811
Tholouse,	126 $\frac{1}{17}$	.059
Rochel,	128 $\frac{1}{4}$	.241
Marseilles,	127 $\frac{3}{5}$	.609
Sevil,	112 $\frac{3}{4}$	.708
Venice subt.	171 $\frac{1}{3}$	.373
Venice gros.	108 $\frac{1}{5}$	.215
Vienna,	91 $\frac{3}{4}$	.784
Preslaw,	138 $\frac{1}{4}$	.254
Leibzick,	104	.000
Dantzick,	132 $\frac{3}{4}$	.734
Barcellone,	147 $\frac{1}{3}$	.368
Genoa,	161 $\frac{1}{2}$	.489

Barcellone.

100 pound weight at *Barcellone* makes at

			or Decimal parts.
London,	78	$\frac{1}{20}$	.048
Antwerp,	75		.000
Lisbon, Franckf.	68		.989
Nuremberg,	70	$\frac{1}{16}$	.061
Roan,	68	$\frac{2}{7}$	.290
Lions,	82	$\frac{4}{7}$	.578
Paris,	71	$\frac{1}{4}$	.254
Diep,	69	$\frac{6}{7}$	.860
Geneva,	62	$\frac{49}{50}$	.979
Tholouse,	85	$\frac{7}{13}$	.540
Rochel,	87	$\frac{1}{50}$	.021
Marseilles,	86	$\frac{7}{12}$	.585
Sevil,	76	$\frac{12}{25}$	.480
Venice subt.	116	$\frac{3}{20}$	.149
Venice gros.	73	$\frac{7}{16}$	.432
Vienna,	62	$\frac{2}{7}$	.282
Preslaw,	93	$\frac{2}{17}$	.118
Leibzick,	70	$\frac{5}{9}$	.557
Dantzick,	90	$\frac{1}{16}$	.061
Lubeck,	67	$\frac{6}{7}$	.857
Genoa,	109	$\frac{7}{12}$	.581

Genoa.

Genoa.

100 pound weight at *Genoa* makes at

		or Decimal parts.
London,	71 $\frac{2}{9}$	.224
Antwerp,	68 $\frac{4}{9}$	.442
Lisbon, Franckf.	62 $\frac{24}{25}$	.957
Nuremberg,	63 $\frac{10}{11}$	.910
Roan,	62 $\frac{6}{19}$	.320
Lions,	75 $\frac{5}{14}$	.357
Paris,	65 $\frac{1}{43}$	.023
Diep,	63 $\frac{3}{4}$	.752
Geneva,	57 $\frac{12}{25}$	.478
Tholouse,	78 $\frac{1}{17}$	.060
Rochel,	79 $\frac{5}{12}$	.411
Marseilles,	79 $\frac{1}{71}$	.014
Sevil,	69 $\frac{4}{5}$	.793
Venice subt.	106 $\frac{1}{8}$	.121
Venice gros.	67	.011
Vienna,	56 $\frac{5}{6}$	.836
Preslaw,	85 $\frac{8}{13}$	.612
Leibzick,	64 $\frac{5}{11}$	.388
Dantzick,	82 $\frac{1}{5}$	.194
Lubeck,	61 $\frac{12}{13}$	.923
Barcellone,	92 $\frac{3}{11}$	.272

The Hundred Weight at *Aquila* is equal to the Hundred Weight at *Genoa*.

A Table of Coins, Gold, Silver, and Braß, of modern Use: With their Weights and the Proportion of Foreign to our English.

The Names of Gold.	weight.		price.	
Of Angels and Albertus.	d.	gr.	s.	d.
ENgliſh Angel, or Angel noble	3	8	11	0
Half an Angel	1	16	5	6
Flemiſh or *Flanders* Angel beſt	3	6	9	0
Albertus of the Archduke, or Ducat	3	9	11	3
Of Caſtilions.				
Golden Caſtilion	2	23	8	10
Of Cruſados.				
Cruſados with the long †	2	6	6	0
Cruſados with the ſhort Croſs †	2	6	6	2
Great Cruſado of *Portugal*	2	16	7	0
Firſt Crown of K. *Henry* 8. beſt	2	9	6	11½
Baſe Crown of K. *Henry* 8.	2	0	5	6
Crown of Q. *Elizabeth*	1	9	5	6
Britain Crown of K. *James*	1	1	5	6
The double *Britain* Crown	3	6	11	0
New Crown of K. *Jam.* & K. *Charls*	2	5	5	0
Scottiſh Crown	2	5	6	0
Half thiſtle Crown	2	5½	2	9
K. *Philips* Crown of *Spain*	2	5	5	0
Flemiſh or *Flanders* Crown	2	5	6	0
French Crown	2	5	6	0
Old *French* Crown	2	5	6	8
The pieces called 4 Crowns of *Port.*			26	2
Golden Crown of *Italy*			6	0
Of Ducates, Simple, Double, &c.				
Ducat ſingle of *Spain*	2	6	6	6
Ducat double of *Spain*	2	11	13	0

Great

	d.	gr.	s.	d.
Great Ducat of *Spain*			13	0
Ducat simple of *Rome*	2	6½	6	4
Ducat double of *Rome*	4	13	12	8
Ducat of *Florence*	2	5	6	4
Ducat of *Valence*	2	5	7	2
Ducat of *Arragon*	2	6	6	6
Ducat of *Hungary* or *Hung.* Ducat	2	7	6	4
Ducat of *Suevia*	2	7	7	10
Ducat of *Turkey*			8	9
Ducat of *Hamborough*			9	2
Denning of *Muscovy*			7	10
Florens and Gilders.				
New Floren or Gilden S. *Andrew*	2	2	5	0
Old Gilden S. *Andrew*	2	3	5	4
Carolus Gilden or Gilder	1	12	3	6
Collen Gilden	2	2	4	8
Davids Gilden	2	2	4	0
Crowns or Escus.				
Horn Gilden	1	12	4	11
Saxon Gilden	2	2	4	8
Philip Gilden	2	3	4	2
Half *Philips* Gilden	1	1	2	1
The new Rider of *Gilders*	2	6	7	0
Golden Lions.				
Golden Lion	2	16	7	8
1 part of it		21	2	5
2 part of it	1	19	4	11
Guldens.				
Golden Gulden	2	6	5	9
Golden *Rhenish* Gulden	2	8	7	8
Marks.				
Mark of *Bohemia*			6	0
6 Marks of *Suecia*			4	9

	d.	gr.	s.	d.
20 Marks of *Scotland*			22	0
5 Marks of *Scotland*			5	6
Mill-rays	4	20	13	4
Half Mill-rays	2	10	6	8
Of Nobles.				
Angel Noble of *England*	3	8	11	0
Old Angel Noble of *England*	4	6	14	8
Half of the Angel Noble of *Engl.*	2	4	7	2
George Noble of *England*	3	0	9	9½
Rose Noble	4	13	14	16
Flemish or *Flanders* Noble	4	10	12	0
Pistolets and other pieces.				
Single or simple Pistols	2	4	5	10
Double Pistols	4	9	11	8
Portuguez or great Crusade			3*l.* 12*s.*	
6 Pound *Scottish*	3	0	10	0
Spanish Pistolet of 26 Royals			14	0
12 Pound *Scottish*	6	22	20	0
Of Riders and Horsemen.				
Riders of *Flanders*	2	6	6	6
Riders of *Gilders* of *Friesland*	2	2	3	6
Ruble of *Poland*			13	4
Ruble of *Muscovia*			10	0
Of Royals or Reals.				
Rose royal or real of *England*	10	21	33	0
Spur royal of *England*	4	10	16	0
Half spur royal	2	11	8	0
Philip Real with spread Eagle	2	6	5	6
Philip Real of *Spain*	3	10	5	6
Flemish Real called the Key		10	11	0
Of Salutes.				
Salute of *England*	2	5	6	11½

Of

The Names of Gold.	d.	gr.	s.	d.
Shock of *Bohemia*			8	0
Of Soveraigns.				
Soveraign of K. *Edw.*	3	15	11	0
Soveraign of K. *Henry* 8.	4	0	11	0
Soveraign of K. *Henry* the best	3	14	11	8½q
Soveraign of Q. *Elizabeth*	3	15	11	0
Soveraign of K. *James*	3	14	11	0
Great double Soveraign	6	16	22	0
Great triple Soveraign	10		33	0
Spanish Dublion			14	6
Sultan of Gold *Turkey*			7	6
Of Unites and Unicorns.				
Unites of K. *James*			21	0
Unites of *Scotland*			6	8
Zechines of *Venice*			7	6

In the use of these Tables you may do well to take notice, that since this Collection, the Value of Gold is much risen. So that you may more exactly find the present Value of any of these Pieces by their Weight and Fineness according to this Table.

		Angel			*Crown*			*Soveraign*		
1	Peny weights are worth	4*s.*	2*d.*	*ob.*	3*s.*	10*d.*	*ob.*	3*s.*	6*d.*	*ob.*
2		8	5		7	9		7	1	
3		12	7	*ob.*	11	7	*ob.*	10	7	*ob.*
4		16	10		15	6		14	2	
5		21	0	*ob.*	19	4	*ob.*	17	8	*ob.*
6		25	3		23	3		21	3	

SILVER

SILVER COINS.

Aten of *Muscovia*	4. 0	*Flemish* Shilling	7. *ob.*
Aspers	0 *ob. qd.*	Franks of *Turkey*	2.0.
Attine of *Poland*	0. 4 *ob.*	*Flemish* silver Gulden	2.0.
Babee of *Scotland*	*ob.*	Finferlin	0. *ob.*
Batz	0. 3.	Silver Gulden	3. 10.
Bemish of *Switz.*	0. 2. *ob.*	Silver Groshen	2. 0.
Biancco of *Italy*	0. 8.	Silver Misen Groshen	0. 3.
Blancks	0. *ob. qd.*	*Polish* Groshen	0. 1. *ob.*
Boligneo	0. *ob. qd.*	*Mary* Groshen	0. 1. *qd.*
Caveleto of *Italy*	0. 3. *qd.*	*Mesnish* sil. Grosh.	0. 2. *ob. q.*
A Medine of *Cairo*	0. 2. *qd.*	Gagatta of *Italy*	0. 1.
Carlini of *Italy*	0. 6.	Popes Gnibii	0. 6.
Crown of *Turkey*	6. 0.	Grots of *Germ.*	0. 1. *q.*
Crown of *Italy*	5. 0.	Justino of *Italy*	1. 6.
Cupstoke	1. 0.	Lyre of *Venice*	0. 9.
Creitzers of *Poland*	0. *ob. qd.*	Lyre of *Genoa*	1. 4.
Philip Doller	5 0.	Mark of *Denmark*	2. 2.
Lions Doller of the Low-Countries	4. 0.	Mursenigo	0. 11.
Ricks Doller of *Germ.*	4. 8.	Mark of *Scotland*	1. 1. *ob.*
Ricks Doller, or imperial Doller of *Suecia*	5. 2.	Psound	0. 4. *ob. q.*
Ricks Doller, or Merchants Doller of *Suecia*	3. 2.	3 Pounds piece of *Scotl.*	5. 0.
Cross Doller of *Alb.*	4. 8.	Plappot	0. 2. *ob. q.*
Dollers of *Zeal.* and *Friesl.* with the Eagle	2. 10.	Poali of *Italy*	0. 6.
Dicken of a wing	1. 4.	Quartidiescue	1. 6.
Drier	*ob. qd.*	Reale	0. 5. *ob.*
The piece of four Rials	4. 3.	Roustick	0. 1. *ob.*
Flabes in the L. Count.	1. 4.	Royals of Eight	4. 5.
		Rappen muntz	0. 2. 0.
		Sestling	0. *ob. qd.*
		Stiver	0. 2. 0.
		Emden Stivers	0. 1. *qd.*

Schane-

Schaneberger	1. *ob.* *qd.*
Hamborough Shil.	0. 9. *ob.* *qd.*
Shilling of *Germ.*	0. 5. *qd.*
Danish Shil.	0. 0. *ob.* *qd.*
Lubeck shil.	0. 1. *ob.* *qd.*
Scottish Shilling	1. 0.
Shil. of *Switzerland*	1. *d.*
Sicherling	1. 0. *qd.*
Scaby of *Turkey*	0. 6.
Scya of *Turkey*	6. *qd.*
Soulz	0. 1. *ob.*
Souldi of *Genoa*	0. *ob.* *qd.*
Brass Money.	
Augster of *Switz.*	0. *qd.*
Dryneller	0. *qd.*
Diner of *Genoa*	0. 0.
Diner of *Turkey*	0. *q.*
Holler	0. *q.*
Marvedes	
Orkes	0. *q.* 0.
Penning	0. *q.* 0.
Peny of *Scotland*, 12 make a Peny *English*	
Pochanel	0. *qd.*
The Piece, 3 to a Peny	
The Terner, 6 make a Peny.	
Quaterner	0. *q.*

Note, The Figure in the first place signifieth shillings, in the second pence, the rest are obvious.

FINIS.